START

Superfund Technical Assessment and Response
Region VIII

United States
Environmental Protection Agency

Contract No. 68-W5-0031

SAMPLING ACTIVITIES REPORT

R. J. REFINERY
La Barge, Wyoming

TDD No. 9804-0002

MARCH 30, 1999

URS
OPERATING SERVICES, INC.

In association with:
Tetra Tech EM Inc.
URS Greiner
Maxim Technologies, Inc.
LT Environmental, Inc.
The Roybal Corporation

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SAMPLING ACTIVITIES REPORT
R. J. REFINERY
La Barge, Wyoming

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1.0 INTRODUCTION

This Sampling Activities Report (SAR) is submitted in accordance with the task elements specified in Technical Direction Document (TDD) 9804-0002 issued to the URS Operating Services, Inc. (UOS) Superfund Technical Assessment and Response Team (START) in Region VIII by the U.S. Environmental Protection Agency (EPA).

Between April and November 1998 START conducted site assessment activities during four trips to the R. J. Refinery site located near La Barge, Wyoming (Figure 1).

2.0 SITE DESCRIPTION AND BACKGROUND

The R. J. Refinery site is located 0.5 miles southwest of La Barge, Wyoming, and has a legal description of the northeast quarter of the northwest quarter of Section 7 T. 26 N., R. 112 W. The facility is located on gently east-sloping terrain approximately 0.75 mile west of the Green River.

Property ownership remains under investigation because of the death of the refinery operator in 1995.

Operations at the R. J. Refinery began in 1968 and were conducted intermittently until 1994. Several phases of construction and consolidation occurred during the refinery's history and included a period in which two separate refineries were located on the north and south portions of the property. What remains of the refinery process equipment is located on the north portion of the property. Both refineries were known as topping plants capable of only simple distillation to separate low boiling point gasoline and diesel range hydrocarbons from crude oil. Throughput capacity was approximately 1,000 barrels per day. Three process units existed during the refinery history that blended organic lead with gasoline. Federal regulations phased out the use of leaded gasoline by 1984. A retail gasoline station was constructed adjacent to the north refinery. Aboveground storage tanks (ASTs) or underground fuel storage tanks (USTs) associated with the station remain at the site.

3.0 SITE ACTIVITIES

Four site visits were conducted by EPA and START with samples collected and objectives as follows:

Date	Scope	Samples	Analysis
April 8, 1998	Site familiarization and assessment. Meeting with a former refinery employee. Potential source samples were collected.	4 Surface soil 1 Subsurface soil 2 Fibrous materials 1 Surface water 1 Drum liquid	TAL metals 1-TCLP metals Asbestos VOCs VOCs
August 3-4, 1998	Interview former refinery employees and neighbors. Sample drum excavation area.	1 Surface soil	TAL metals and VOCs
August 11-14, 1998	Used the Geoprobe® at 17 locations to collect subsurface soil and groundwater samples. Began assessment of the extent and magnitude of contamination.	11 Subsurface soil 5 Groundwater 1 Sump water	TAL metals and VOCs VOCs VOCs
October 27-29, 1998	Installed and sampled five monitor wells. Established site groundwater flow direction. Collected four tank bottom sludge/solids samples.	5 Groundwater and 1 duplicate 4 Tank bottom sludge/solids	VOCs and TAL metals TCLP metals

3.1 SITE ACTIVITIES ON APRIL 8, 1998

EPA On-Scene Coordinator (OSC) Joyce Ackerman, and START member Jerry Goedert were met at the site by Wyoming Department of Environmental Quality (WDEQ) personnel Lynda Fivas and Bob Breuer. Based upon information provided a former R. J. Refinery employee, a cursory understanding was gained of past refinery operations and the current status of tanks. Approximately 28 ASTs ranging in size from an estimated 6,000 to 1,000,000 gallons are present on the property. Three ASTs and one UST associated with the retail service station are located northwest of the refinery. Although a former refinery employee indicated that the tanks did not contain appreciable product, tank bottom residue had not been removed. A tank inventory was not performed. Photographs provided in Appendix A show the site layout and terrain that slopes gently east. An east-west depression runs between north and south tank farms. A small flow of water was observed downgradient exiting from the fire water pond into the pooled area (Figure 2). Seepage from the pooled area flows east but dries up prior to reaching Refinery Road.

Present commercial activities occurring at the site include the use of the service station building for a tow truck business; Silver Eagle Petroleum leased one tank of the southeast tank farm for crude oil storage; and the south Quonset hut was leased for truck storage and maintenance.

The three large tanks at the southeast tank farm have reportedly been used once or twice since installation (Figure 2). According to Ms Fivas, USTs may be present at three additional locations as noted on Figure 2. The condition or contents of the tanks is unknown.

The site has unimpeded access and is within 0.25 mile of 10 to 15 residences to the north and east.

A small chemical storage room/laboratory located in the north part of the south Quonset hut was evaluated. The laboratory apparently supported refinery operations. The following chemicals were present in pint- to gallon-size glass bottles:

Hexanes	Lead Acetate	Sulfuric acid
Sodium thiocyanate	Acetone	Corrosion bath oil
Potassium chromate	Ferric ammonium sulfate	Antistatic agent - Stadis 450
Hydrochloric acid	Benzene	Silver nitrate
Bleach		

Samples collected near likely spill locations included fibrous material, a drum liquid sample suspected to be diesel fuel dye, and surface water (sample RJ-PR-02) with a sheen on the surface (Figure 2). Focus was placed on three organic lead addition facilities because of stains on a concrete pad and suspect piping schemes.

Prior to this site visit the refinery caretaker had mobilized a backhoe to the south side of the fire water pond located on the west side of the property. This pond water was designed for use in the event of a fire at the facility. The backhoe excavated an area along the central portion of the pond where two 55-gallon steel drums were reportedly buried. The excavation revealed only the outline of the drums and drum fragments. The former contents are unknown.

3.2 SITE ACTIVITIES ON AUGUST 4, 1998

EPA OSC Ackerman, START Goedert, and WDEQ Fivas met in La Barge, Wyoming met at the site. Prior to visiting the site, the OSC contacted and interviewed former refinery personnel. Once on site, a neighbor to the refinery was contacted and interviewed.

One soil sample (RJ-SO-06) was collected beneath approximately six inches of water within the drum excavation previously discussed. This sample was collected in an attempt to determine whether soil contamination had resulted from the former drum contents.

3.3 SITE ACTIVITIES ON AUGUST 11 THROUGH 14, 1998

EPA OSC Ackerman and START members Goedert, Kuoppala, and LaRow met WDEQ representative Fivas at the site. The objective of this trip was to delineate the extent and magnitude of suspected subsurface soil and groundwater contamination.

A Geoprobe®, which is a pick-up truck-mounted device that uses hydraulics and the weight of the truck to advance a core barrel typically down to 30 feet below ground surface (bgs), was mobilized to the site. Core samples are collected in three-foot increments. The Geoprobe® is also used to collect groundwater samples. A three-foot-long, one-inch diameter steel rod with an expendable point on the bottom is advanced into the ground by attaching and pushing/hammering successive rods until the desired depth is reached. The rod string is pulled up slightly so that the expendable point falls off. Tygon® tubing is lowered into the hollow rod string below the bottom of the last rod. A Peristoltic pump is used to pump water to the surface through the Tygon® tubing.

During this trip Geoprobe® sampling was attempted at 17 locations (Figure 3). Ten were successful in retrieving subsurface soil. Groundwater samples were obtained at five locations (BH-1, BH-3, BH-5, BH-7, BH-16). The inability to push through resistant strata at locations BH-10 through BH-15 and BH-17 at depths of 2 to 12 feet bgs prevented the Geoprobe® from reaching groundwater. A table of Geoprobe® results is provided in Table 1.

Based on soil staining and petroleum odor, the Geoprobe® results established the presence of petroleum-impacted subsurface soils in the north and east portion of the site. Soil and groundwater analytical results confirm field observations. The dimensions of impacted soils established by Geoprobe® samples is approximately 500 feet east to west and 100 feet north to south. Depth of contamination ranged from 1 to 8.5 feet bgs. The eastern (downgradient) extent of contamination was not established due to the limitations of the Geoprobe®.

In the central portion of the site, the pooled water area that was present in April was dry during this trip, and no surface water seepage was observed east of the pooled water area.

3.4 SITE ACTIVITIES ON OCTOBER 27 AND 28, 1998

EPA OSC Ackerman and START members Goedert and Carmien met WDEQ Fivas at the site. The objective of this trip was to further investigate groundwater contamination at the east end of the site and downgradient of the fire water pond. A secondary purpose was to establish the direction of groundwater flow. In addition, tank bottom sludge/solids from four tanks were sampled.

UOS subcontracted Quality Remediation of Vernal, Utah, who utilized a Model BR51 hollow stem auger rig for monitor well installation. Five two-inch diameter wells were installed and one soil boring advanced, which did not encounter a saturated interval (Figure 4). A split spoon sampler was used initially to evaluate lithology and characterize subsurface soil staining. However, cobbles were encountered that prevented use of the split spoon sampler. Thereafter drill cuttings were logged and evaluated as they were brought to the surface. Soil types were not consistent among monitor wells/borings and included clay, silt, and gravel. Drill cuttings were drummed and later sampled. Laboratory results from the samples will be used to determine appropriate disposal.

The wells range from 9 to 24 feet bgs completion depth and are completed with five or ten feet of two-inch ID PVC well screen with 0.01-inch slots across from saturated soil. Well casing above the well screen is two-inch-diameter PVC. Annular space between the outside diameter of the hole and PVC is filled with 10/20-mesh silica sand from the bottom of the well to the top of the well screen. Bentonite pellets were placed from the top of the sand pack to two feet bgs. Grout is mixed and poured in the top two feet of annular space. Completion details and lithology encountered in each well and soil boring are provided in Appendix B. A locking protection box three feet above grade was installed at each monitor well.

The monitor wells further established the existence of dissolved phase hydrocarbon groundwater and subsurface soil contamination. The known eastern extent of soil contamination was extended by approximately 100 feet but the limit was not reached. Monitor wells MW-3 and MW-4 showed an absence of contaminated soils and appear to demonstrate that the southeast tank farm has not resulted in significant groundwater contamination.

After installation, each well was developed by pumping groundwater with a Geosquirt® submersible pump that removed silt and sand. Approximately 20 gallons of groundwater was pumped into 55-gallon drums at each well. Subsequently the wells were sampled.

In order to determine the groundwater gradient, START first established the relative coordinates and elevations of casing tops for each well. Combined with depth to groundwater data obtained at each well prior to sampling provides the relative groundwater elevation data necessary to draft a groundwater contour map (Figure 5). As expected, groundwater flows east-southeast from the site toward the Green River.

Liquid levels in 18 tanks were gauged in order to identify tanks suitable for collecting sludge samples (Table 2). The purpose of tank bottom samples was to begin to characterize the applicability of RCRA regulations to the material. No attempt was made to sample or characterize tank liquids.

The tanks selected for sampling were Tanks #7, A5, K, and the east tank of the southwest tank farm. Tanks 7 and K samples were sludge; Tank A5 contained a dry red solid; and the unnumbered tank contained a paraffin solid consistent with high pour point crude oil. These samples were submitted for Toxicity Characteristics Leaching Procedure (TCLP) metals and volatile organic compounds (VOC) analysis.

During this trip, the EPA Region VIII Emergency and Rapid Response Services (ERRS) contractor, Environmental Chemical Corporation (ECC), was on site to lab pack the laboratory chemicals discussed in Section 3.1. ECC was tasked by the OSC to procure appropriate disposal for the lab pack containers.

In addition ECC rented a backhoe for the purpose of digging test pits south of the fire water pond. Due to recent precipitation and resulting muddy conditions, only two test pits were excavated before abandoning this effort. No evidence of buried drums was encountered in the test pits.

4.0 SAMPLING PROCEDURES

Sampling procedures are identified in the Field Sampling Plan and were directed by UOS Technical Standard Operating Procedures (TSOPs) (URS Operating Services, Inc. (UOS) 1995).

4.1 SAMPLE IDENTIFICATION

Samples were identified following UOS TSOP 4.4, Sample Identification, Labeling, and Packaging. Sample identifiers consisted of site code, sample type, and sample number. Each sample was labeled with a tag containing a unique sample number. The tag included the sample identifier, date, time, project number, location, analytical parameters to be analyzed for, and sampler signature.

4.2 DOCUMENTATION

Data collected in the field were recorded in a field log book according to UOS TSOP 4.6, "Use and Maintenance of Field Log Books." Custody of samples was documented according to UOS TSOP 4.3, "Chain of Custody" (UOS 1995).

4.3 SOIL SAMPLING

4.3.1 Surface Soil

Six soil samples were collected during the first two site trips. These were identified as RJ-SO-01 through RJ-SO-06. Sample locations were determined by the OSC and were judgmental. Surface soil samples were collected using disposable plastic scoops. Sample RJ-SO-04 was collected from an excavated pit approximately three feet bgs. Samples were collected directly into eight-ounce glass jars and submitted to Analytica Laboratories, Broomfield, Colorado.

4.3.2 Geoprobe® Subsurface Soil

Eleven subsurface soil samples were collected using the Geoprobe®. Subsurface soil was collected in disposable acetate sleeves inside a steel core barrel. The sleeves were labeled to designate the core depth. Sample collection was accomplished by slicing the acetate sleeve and placing soil into glass jars by hand. Latex gloves, changed between samples, were used to prevent cross contamination. Samples were designated "BH" followed by a number that indicates the borehole identification. Samples were submitted to Galson Laboratories, East Syracuse, New York, via Federal Express for TAL metals and VOC analysis.

4.4 GROUNDWATER SAMPLING

4.4.1 Geoprobe® Groundwater

Five groundwater samples were collected with the Geoprobe® as described in Section 3.3. Samples were collected by lowering disposable tygon tubing through the Geoprobe® rods into the groundwater. The tubing is attached to a peristoltic pump and the water sample was pumped directly through the tubing into the sample bottles. Groundwater depths were observed at five to ten feet bgs.

4.4.2 Monitor Wells

Five monitor wells were installed on October 27 and 28, 1998. After installation the wells were developed by pumping 15 to 25 gallons of water to remove silt and provide for a cleaner groundwater sample. Following development, the monitor well sampling process involved removal of three water column casing volumes with a disposable plastic bailer. Samples were then collected by bailer directly into sample bottles. Samples were submitted to Core Laboratories, Aurora, Colorado, for VOC and Target Analyte List (TAL) metals analyses.

4.5 TANK BOTTOM SLUDGE/SOLIDS

Four tank bottom sludge/solids samples were collected on October 29, 1998. The tank manways were removed and samples were collected with a disposable plastic scoop. The tank sample RJ-TB-04 was collected by lowering a disposable plastic scoop through the hatch on top of the tank to the tank bottom. Samples from the tank bottom were collected and placed directly into sample bottles and submitted to Core Laboratories, Aurora, Colorado, for TCLP (VOC and metals) analysis.

4.6 SURFACE WATER

Two surface water samples were collected, RJ-PR-02 and a sump sample from a location near the southwest leading facility. Samples were collected by immersing sample bottles in the water. Sample RJ-PR-02 was submitted to Analytica Laboratories for VOC analysis. The sump sample was submitted to Galson Laboratory for TAL metal and VOC analyses.

5.0 ANALYTICAL RESULTS

5.1 APRIL 8, 1998 TRIP

Lead concentrations reported in five soil samples were low, ranging from below detection limits to 23 milligrams per kilogram (mg/kg) (Table 3). No other metals concentrations were reported at levels exceeding the EPA Region III non-regulatory Risk-Based Concentration (RBC) industrial standards. Sample RJ-SO-04 was also analyzed for TCLP metals and results were reported at below regulatory standards.

One asbestos sample (RJ-AS-02) was reported with three percent chrysolite. Sample RJ-AS-01 was reported with no asbestos (Table 4).

Drum sample RJ-PR-01 was reported with toluene, ethylbenzene, m,p-xylene, and o xylene at 1,200 micrograms per liter (μg/L), 8,300 μg/L, 41,000 μg/L, and 20,000 μg/L respectively. The results are consistent with organic compounds found in diesel fuel dye (Table 5).

Surface water sample RJ-PR-02, which contained a slight petroleum sheen, was reported at non-detect for all VOCs (Table 5).

5.2 AUGUST 4, 1998, TRIP

Results reported for sample RJ-SO-06, taken from the drum excavation area near the fire water pond, revealed low concentrations for RCRA metals and non-detect for VOCs.

5.3 AUGUST 11-14, 1998, TRIP

5.3.1 Inorganic Results in Water

TAL metals results for Geoprobe®-collected groundwater samples show that the RJ-BH-01 sample was reported with the highest analyte concentrations, except for barium, of the five samples collected (Table 6). Many analytes are reported in RJ-BH-01 at concentrations ten times or more than those in the other samples. START believes this resulted from low water recovery and high silt content at the RJ-BH-01 location relative to the other samples.

Although there are no known drinking water wells downgradient of the site, tap water Region III RBC Standards and Maximum Contaminant Levels (MCLs) are provided in Table 6 for comparison purposes because these are the most applicable known standards. This comparison provides a method to evaluate the significance of sample results.

Excluding Sample RJ-BH-01, MCL or RBC standards were exceeded for barium (RJ-BH-03 and RJ-BH-16); iron (all samples); lead (RJ-BH-03, RJ-BH-06); and manganese (RJ-BH-07), nickel (RJ-BH-07), and zinc (RJ-BH-03).

The sump sample collected near the surface water leading facility exceeded the iron and zinc RBC standards.

5.3.2 Inorganic Results in Soil

Results for 11 subsurface soil samples are presented in Table 7 along with the RBC standards for industrial soil. None of the analytes for the samples were reported at concentrations exceeding the RBC standards.

5.3.3 Organic Results in Water

The purpose of VOC analyses of the five groundwater samples and one sump sample was primarily to determine whether chlorinated solvents or non-petroleum chemicals had been spilled at the site. No such compounds were found.

Sample RJ-BH-03 was reported with the highest concentrations of petroleum compounds (Table 8). BTEX (benzene, toluene, ethylbenzene, and xylene) was reported at 25,000 μg/L.

5.3.4 Organic Results in Soil

As with the water samples, the VOC analysis of 11 soil samples was performed to determine whether chlorinated solvents or non-petroleum chemicals were found. Again, no such compounds were found. Samples from locations RJ-BH-03, RJ-BH-04, and RJ-BH-12 were reported with the highest petroleum BTEX concentrations (Table 9).

5.4 OCTOBER 27-29, 1998, TRIP

5.4.1 Tank Bottom Sludge/Solids Samples TCLP Results

TCLP organic and inorganic results are reported in Table 10 for four tank bottom sludge/solids samples. Samples RJ-TB-01 (1.02 mg/L), RJ-TB-03 (4.51 mg/L), and RJ-TB-04 (7.08 mg/L) exceeded the selenium standard of 1.0 mg/L. Benzene is the only VOC reported above the detection limit in samples RJ-TB-02 (0.011 mg/L) and RJ-TB-04 (0.010 mg/L). The benzene TCLP standard is 0.5 mg/L.

5.4.2 Groundwater and IDW Inorganic Results

MCL standards were exceeded for results reported on some of the five groundwater samples for arsenic, barium, chromium, and selenium.

5.4.3 Groundwater and IDW Organic Results

Samples RJ-GW-01, RJ-GW-02, and RJ-GW-06 (duplicate of RJ-GW-02) were reported with VOC concentrations up to 16,000 μg/L (Table 12). The sample from MW-01 had the highest concentrations of BTEX (41,400 μg/L).

6.0 CONCLUSIONS

Based on the analytical results from four sampling trips conducted between April and November 1998, START concludes the following:

- Elevated lead levels were not found in surface soil, subsurface soil, or groundwater.
- A dissolved phase hydrocarbon plume in groundwater was identified in the northeast portion of the site. Figure 6 shows BTEX concentrations in groundwater for Geoprobe® and monitor well samples.
- A free-phase hydrocarbon plume has not been discovered. However, additional monitor well sampling will be performed.
- The boundaries of the dissolved phase plume have not been determined.

Actual and potential environmental concerns that do not present imminent threats to human health or the environment but may need to be addressed in the future are:

- Asbestos on process piping should be removed and properly disposed of.

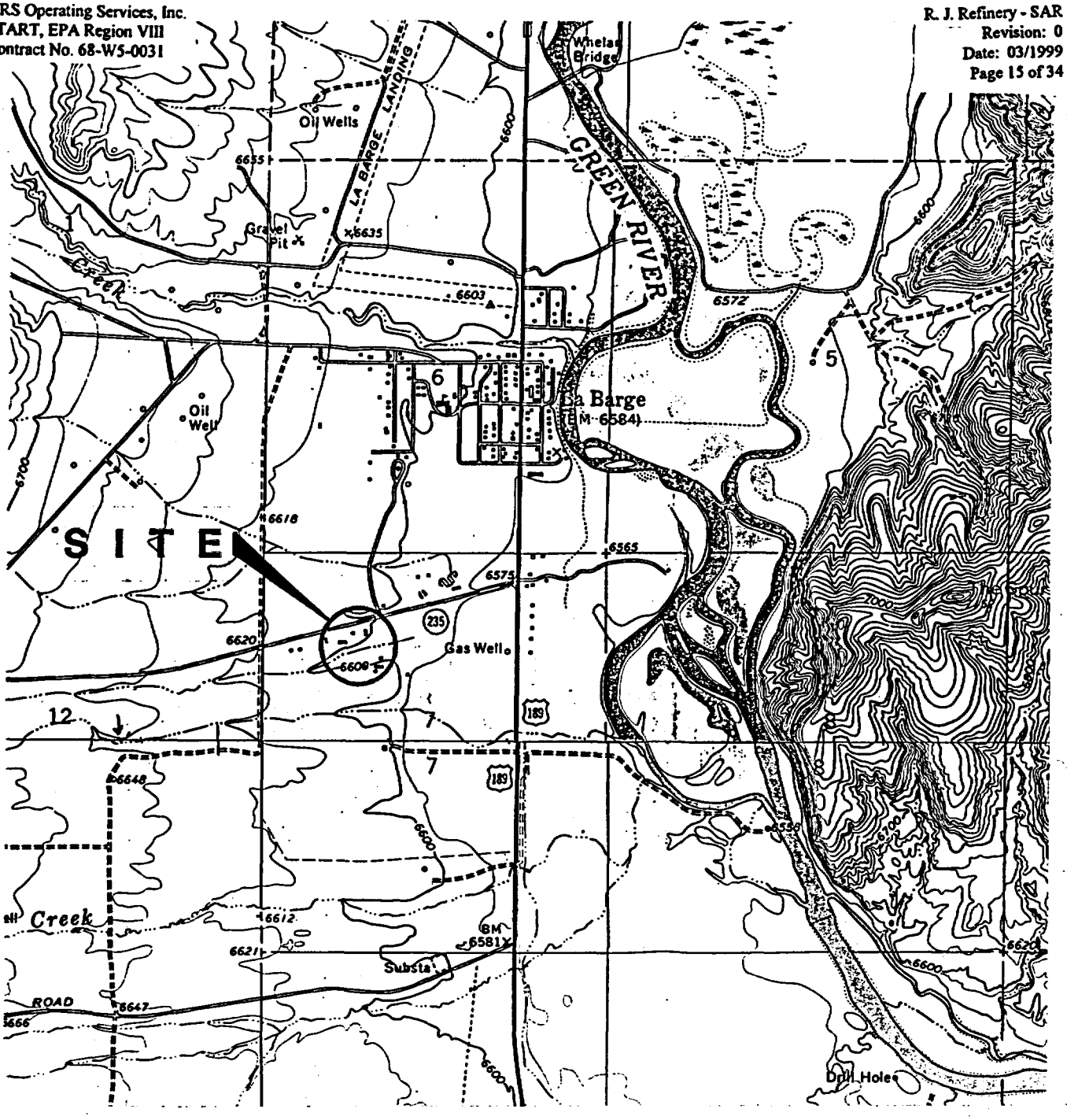
- AST and process equipment liquid contents and bottom sludge/solids should be properly disposed of and ASTs dismantled.

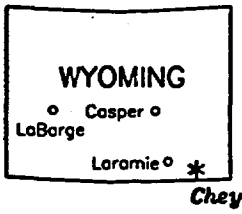
- Because groundwater flow is toward the east-southeast, further investigation of the dissolved phase hydrocarbon plume should include monitor wells located east of Refinery Road.

- Further investigation of four USTs should be conducted.

- Although reports of buried drums were not confirmed, future site reclamation work may expose drums.

- A Spill Prevention Control and Countermeasures (SPCC) (40 CFR 112) inspection is planned to address petroleum storage tank issues at the site.





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VICINITY MAP

Figure 1

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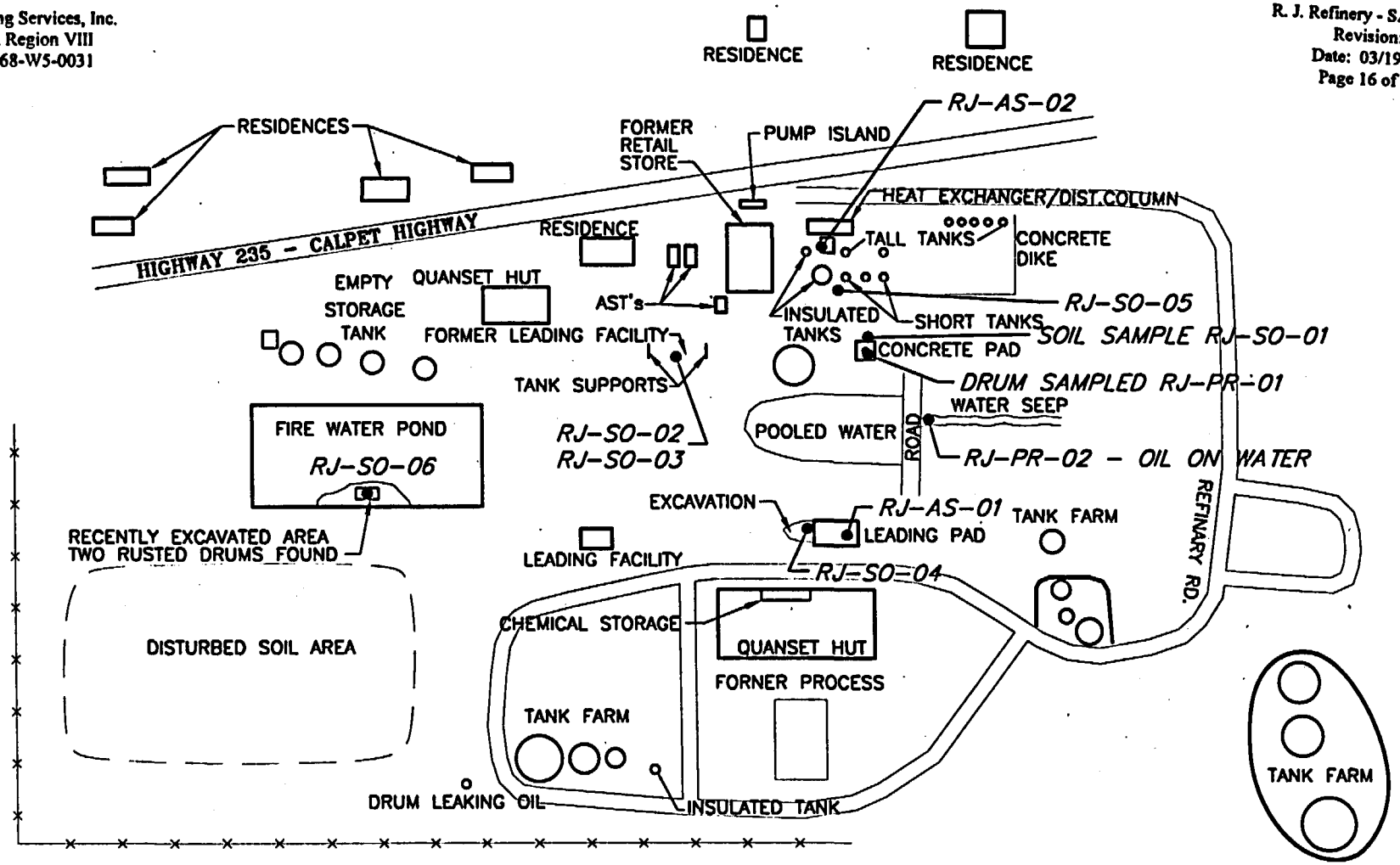

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SAMPLE LOCATION MAP
April 8 & August 4, 1998 Trips
Figure 2

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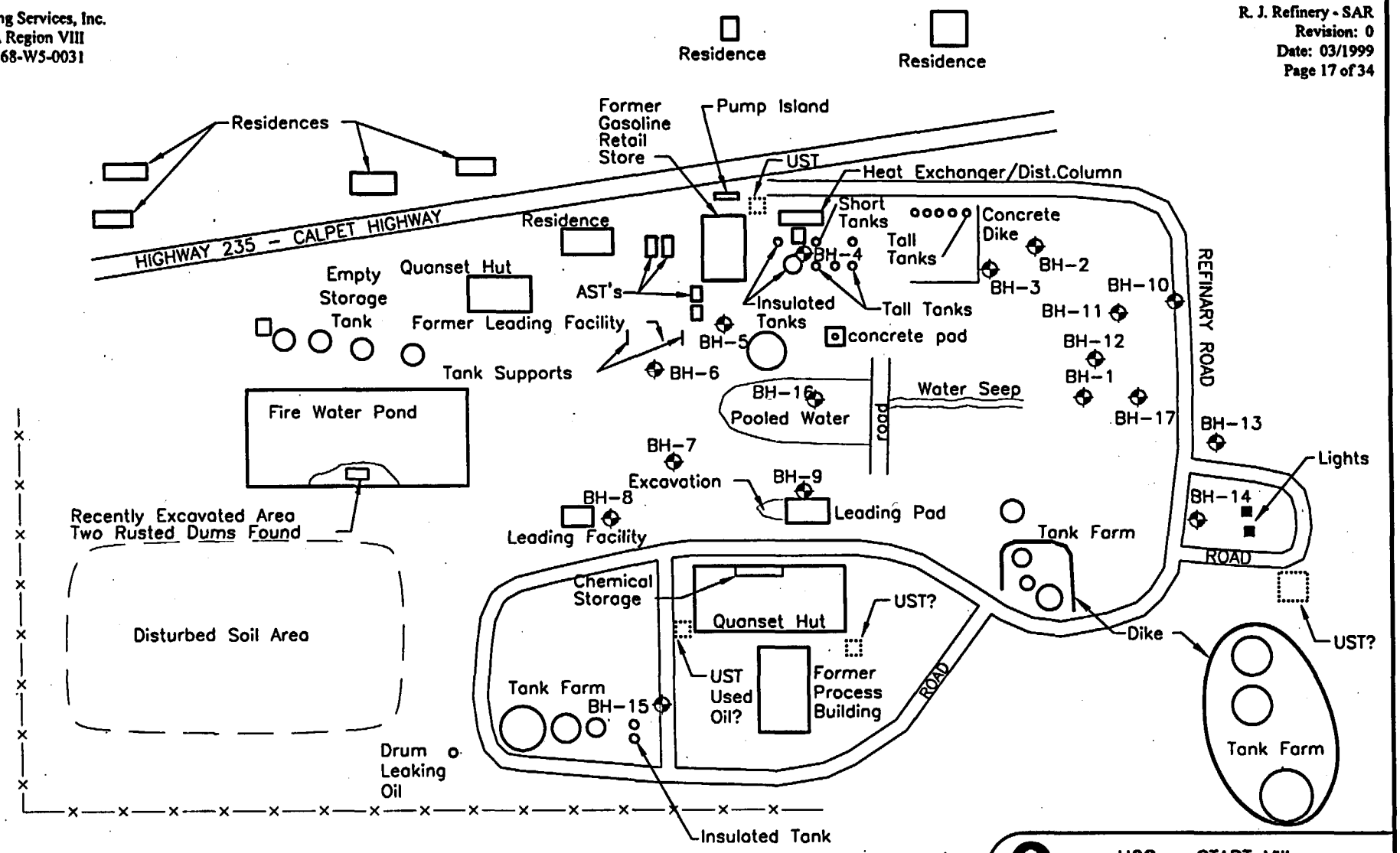

LEGEND

Borehole Location

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SAMPLE LOCATION MAP
August 11-14, 1998 Trip
Figure 3

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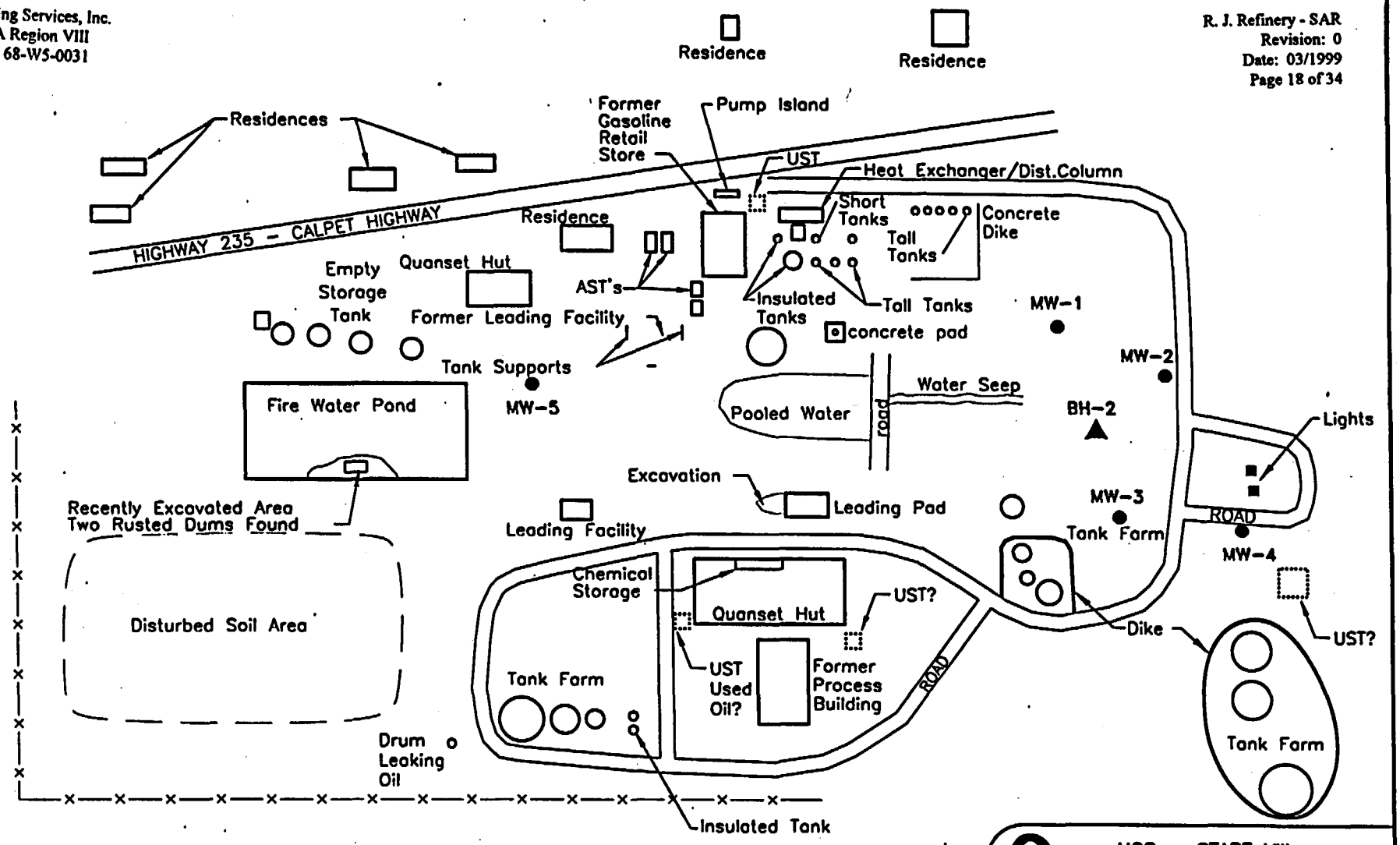

LEGEND

● MW-3 Monitoring Well Locations

▲ BH-2 Soil Boring Locations

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MONITORING WELL
SAMPLE LOCATION MAP
Figure 4

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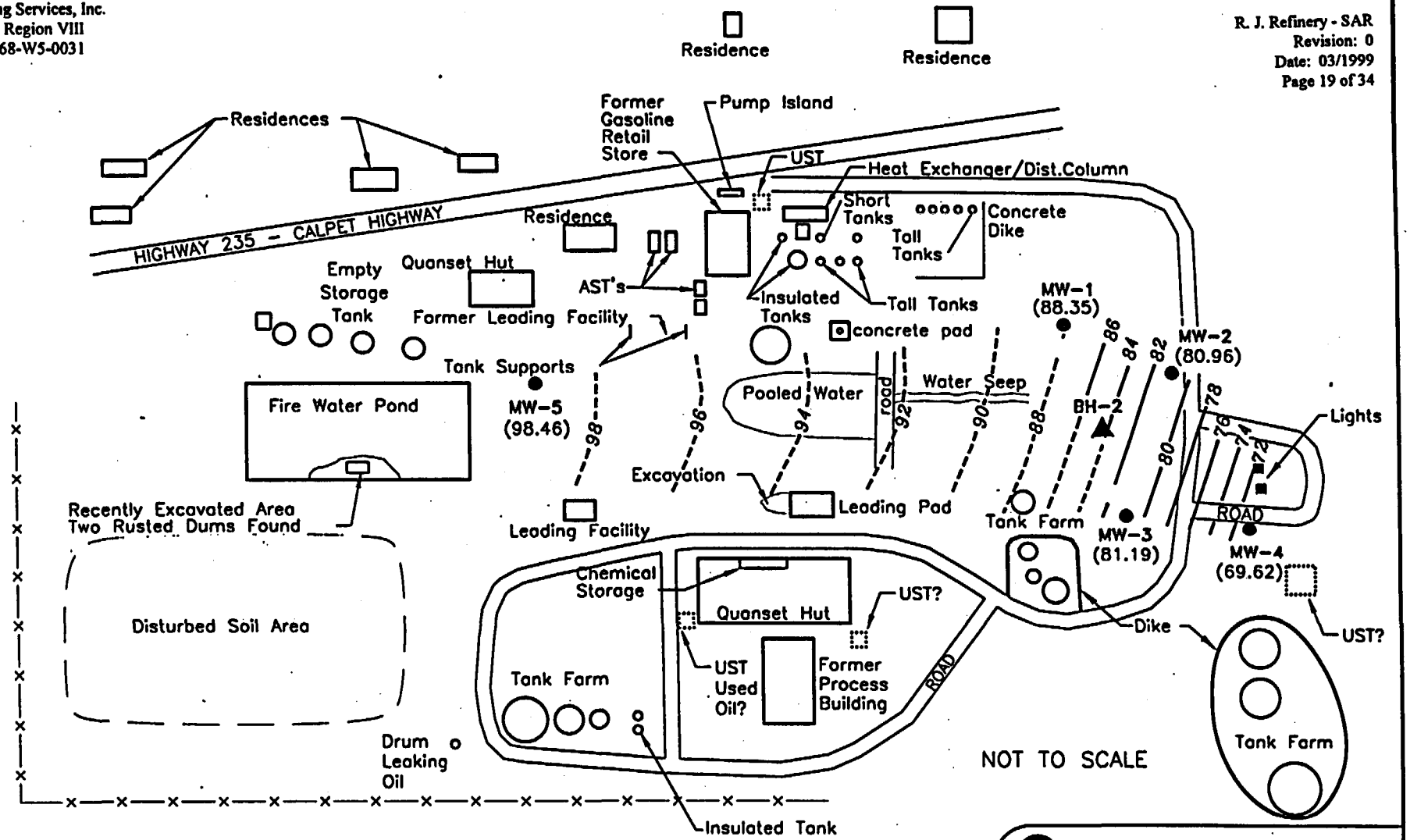

LEGEND

- ● MW-3 (81.19) — Monitoring Well Locations, Relative Groundwater Elevation in Feet
- ▲ BH-2 — Soil Boring Locations
- ---98--- — Monitoring Groundwater Elevation Figures are Relative

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GROUNDWATER CONTOUR MAP
October 29, 1998 Data
Figure 5

March 1999

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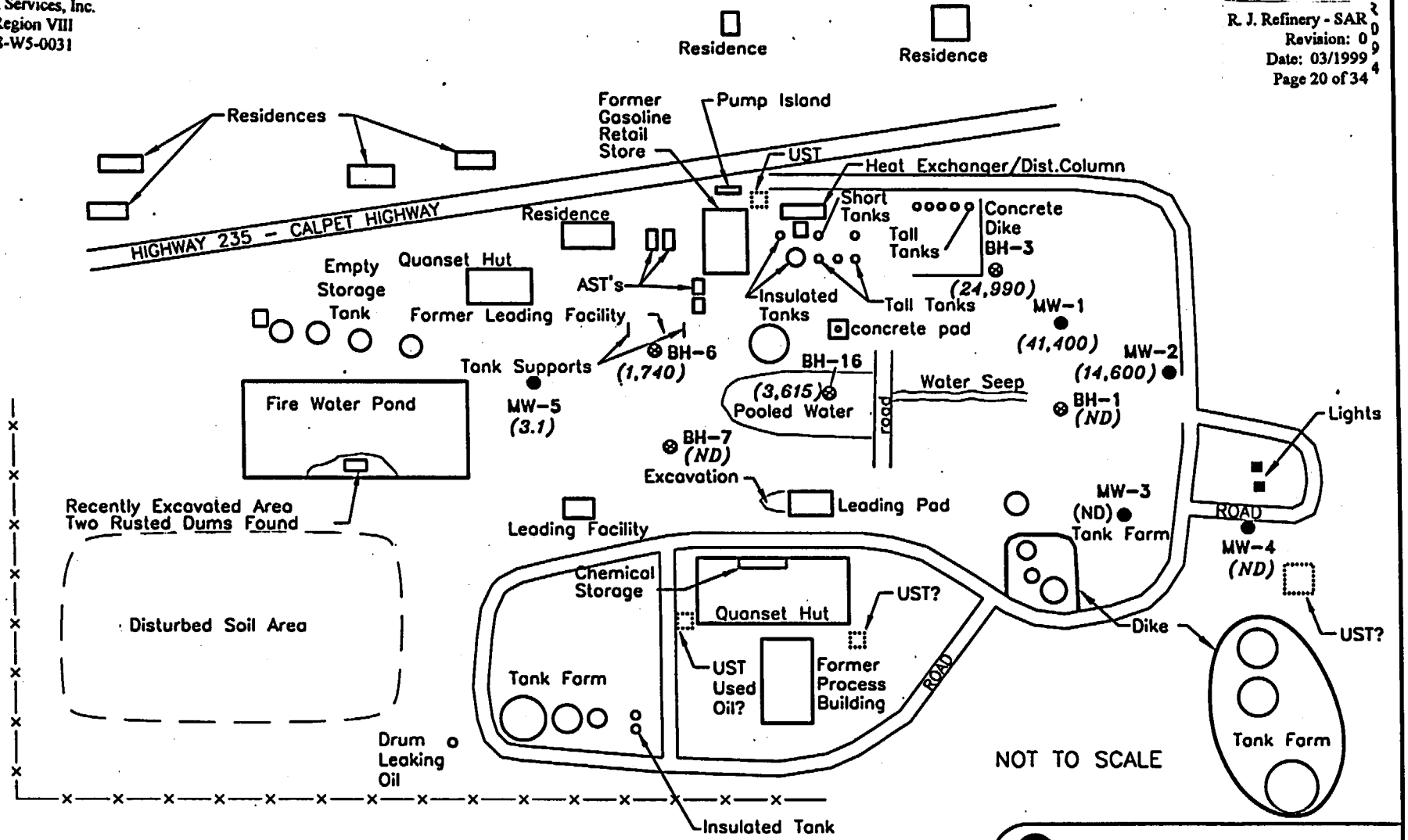

LEGEND

● MW-1 Monitoring Well Locations
(41,400) BTEX Concentrations µg/L
⊗ BH-6 Geoprobe Soil Boring Locations

UOS - START VIII
Job# 9804-02

R.J. REFINERY
La Barge, WY

GROUNDWATER ANALYTICAL RESULTS
Figure 6

March 1999

URS OPERATING SVCS.

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TABLE 1
Geoprobe Location Results

	Total Depth (feet)	Odor/Staining (feet bgs)	Depth of Soil Sample (feet bgs)	Depth of Water Sample (feet bgs)
BH-1	10	7 - 8.5	7	7 - 8
BH-2	15	None	None	Dry
BH-3	6	2.5 - 5.5	3	5.5
BH-4	15 (refusal)	1 to 3.6	3	Dry
BH-5	9	2 to 4.5	5	Unsuccessful
BH-6	9	3 to 7.5	6	5.5
BH-7	13 (refusal)	None	None	8
BH-8	12	None	4	Unsuccessful
BH-9	9	None	3	None
BH-10	9 (refusal)	None	None	None
BH-11	13	8	8	None
BH-12	3 (refusal)	2.3	3	None
BH-13	4.5 (refusal)	None	None	None
BH-14	8.5 (refusal)	None	None	None
BH-15	3 (refusal)	1 to 3 (slight)	None	None
BH-16	9	3 to 7	1 and 5	7.5
BH-17	1.5 (refusal)	None	None	None

TABLE 2
Aboveground Storage Tank Liquid Contents

Tank ID	Liquid Height
North Tank Farm	
A1	1 inch
A2	0
A3	Could not open
A4	Could not open
A5	1 inch
B1	1 inch
B2	0
B3	Inaccessible
Insulated tank next to B3	6 feet
D1	0
D2	4.5 feet
D3	4 feet
Small (23-foot) steel tank north of B3	1 foot
Tank 16 west of 12-foot tank	gauge 4 feet 7 inches
Large black tank southwest of tank D3	0
Southeast Small Tanks	
4	2 feet 2¾ inches
5	16 feet 2⅞ inches
6	15 feet ¾ inches
7	0
Near Quonset Hut	
South insulated tank	4 inches
North insulated tank	4 inches

TABLE 3
Soil Samples - Inorganic Analysis Data (April 8, 1998, and August 4, 1998)
(Concentrations in mg/kg)

Sample ID: Location: Analyte (Abbrev)	RJ-SO-01 Northeast loading facility - surface stained soil	RJ-SO-02 West-loading facility surface soil	RJ-SO-03 West loading facility 1" subsurface soil	RJ-SO-04 TCLP Extracted) (mg/L)	RJ-SO-04 Southeast loading facility 3 feet bgs subsurface soil	RJ-SO-05 Subsurface soil near loading tank.	RJ-SO-06 Fire water pit where two drums were removed	Region III Risk-Based[1] Industrial Soil Standards
Aluminum (Al)	5,600	17,000	14,000	-	4,100	3,100	-	2,000,000
Antimony (Sb)	ND	ND	ND	-	ND	ND	-	820
Arsenic (As)	-	-	-	ND	-	-	7.9	38
Barium (Ba)	170	210	150	0.94	72	110	130	140,000
Beryllium (Be)	0.36	1.1	0.72	-	0.25	0.27	-	4,100
Cadmium (Cd)	1.1	ND	ND	0.0056	ND	ND	0.38 U	1,000
Calcium (Ca)	29,000	49,000	76,000	-	18,000	72,000	-	NA
Chromium (Cr)	210	24	19	ND	6.8	7.1	15.4	2,000,000
Cobalt (Co)	6.7	6.4	5.3	-	2.7	2.5	-	120,000
Copper (Cu)	17	27	17	-	6.1	6.1	-	82,000
Iron (Fe)	17,000	21,000	14,000	-	7,200	8,900	-	610,000
Lead (Pb)	19	23	6.8	ND	ND	10	36.7 *	NA
Magnesium (Mg)	19,000	20,000	24,000	-	2,900	13,000	-	NA
Manganese (Mn)	420	810	500	-	180	260	-	41,000
Mercury (Hg)	-	-	-	ND	-	-	0.07 U	NA
Nickel (Ni)	81	18	12	-	4.9	5.2	-	41,000
Potassium (K)	2,300	-	4,800	-	1,100	950	-	NA

TABLE 3
Soil Samples - Inorganic Analysis Data (April 8, 1998, and August 4, 1998)
(Concentrations in mg/kg)
(continued)

Sample ID: Location: Analyte (Abbrev)	RJ-SO-01 Northeast loading facility - surface stained soil	RJ-SO-02 West-loading facility surface soil	RJ-SO-03 West loading facility 1" subsurface soil	RJ-SO-04 TCLP Extracted) (mg/L)	RJ-SO-04 Southeast loading facility 3 feet bgs subsurface soil	RJ-SO-05 Subsurface soil near loading tank	RJ-SO-06 Fire water pit where two drums were removed	Region III Risk-Based[1] Industrial Soil Standards
Selenium (Se)	-	6,300	-	ND	-	-	0.38 U	10,000
Silver (Ag)	ND	ND	ND	ND	ND	ND	0.25	10,000
Sodium (Na)	15	1,500	840	-	ND	ND	-	NA
Vanadium (V)	-	55	27	-	12	10	-	14,000
Percent Moisture	7.60	26.6	25.0	-	9.40	10.9	-	NA

ND = Not detected at the reported limit.
U = The analyte was not detected above the CRDL.
* = Recovery or %RPD outside method specifications.
- = Not tested.
1 = EPA Region III April 15, 1998, Risk-Based Concentration Standards.
NA = Not Applicable

TABLE 4
Results of Bulk Asbestos Sample Analysis By Polarized Light Microscopy (PLM) (April 8, 1998)
(Results are visual area estimates in percentages)

Sample ID#: Location: AsbestiForm Minerals	RJ-AS-01 South leading facility (white fibrous insulation)	RJ-AS-02 Pipe insulation process area (insulation (two parts) identified as A and B)	RJ-AS-02 [A] (grayish white mud insulation)	RJ-AS-02 [B] (Black felt wrap)
Chrysolite	-	3.0	-	50.0
Total Asbestos	0	3.0	0	50.0
Other Fibrous Materials				
Fibrous Glass	-	14.9	15.0	15.0
Cellulose	10.0	Trace < 1%	Trace < 1%	-
Synthetics	10.0	-	-	-
Percent Nonfibrous Material	80.0	82.0	84.9	35.0

- = Not tested.

TABLE 5
Soil and Liquid Sample Analytical Results - Volatiles by GC/MS
(April 8, 1998 and August 8, 1998)
(Concentrations in μg/L)

Sample ID: Location: Analyte	RJ-PR-01 Blue drum on loading pad	RJ-PR-02 Water seep from ponded area south of concrete dike	RJ-SO-06 Fire water pit where two drums were removed.
Toluene	1,200 D	ND	ND
Ethylbenzene	8,300 D	ND	ND
m,p-Xylenes	41,000 D	ND	ND
o-Xylene	20,000 D	ND	ND
2-Chlorotoluene	180 DJ	ND	ND

* = VOC analytes not listed were reported as ND for all samples.
D = analyte was diluted to bring within instrument calibration range or to remove matrix interferences.
J = Analyte was detected above the instrument detection limit (IDL) but below the analytical reporting limit (CRDL).
ND = Not detected at the reported limit.

TABLE 6
Geoprobe® Groundwater Sample Inorganic Analytical Results
(Concentrations in μg/l)

Sample ID: / Sample Location: / Analyte	BH-1 ~150' east of culvert	BH-3 ~20' from SE corner of concrete dike	BH-6 ~15' South of western leading facility	BH-7 ~75' NE of SW leading facility	BH-16 ~20' west of facility access rd	SUMP east of SW leading facility	Tap Water Risk-Based[1] Concentration Standards and MCL
Aluminum	106,000	1,340	1,350	782	656	599	32,000
Antimony	3.0 U	5.5 J	3.0 U	3.0 U	3.0 U	3.0 U	15
Arsenic	145	23.1	14.2	38.4	32.9	17.8	50*
Barium	4,550	7,190	872	233	2,610	401	1,000*
Beryllium	24.9	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	73
Cadmium	82.0	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	10*
Calcium	17,900,000	982,000	1,030,000	1,300,000	869,000	165,000	NA
Chromium	1930	12.8	11.5	1.4 J	4.2 J	1.0 J	50*
Cobalt	379	4.4 J	2.6 J	27.9 J	3.0 J	6.4 J	2,200
Copper	1,750	23.6 J	11.7 J	16.3 J	18.1 J	19.1 J	1,500
Iron	623,000	75,900	59,000	16,100	38,700	21,500	11,000
Lead	1,110	167	613	1.0 U	1.0 U	8.9	NA
Magnesium	1,430,000	205,000	254,000	266,000	196,000	30,300	NA
Manganese	159,000	3,140	4,220	9,610	1,700	1,730	5,100
Mercury	6.2	2.0	0.10 U	2.0	1.7	0.10 U	2*
Nickel	1,360	28.5 J	10.0 J	855	6.0 J	8.5 J	730
Potassium	95,400	39,400	24,300	24,800	16,900	31,800	NA
Selenium	4.2 J	3.0 U	3.0 U	4.7 J	3.0 U	3.0 U	10*
Silver	8.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	50*
Sodium	901,000	531,000	428,000	451,000	475,000	14,700	NA
Thallium	70.5	6.0 U	6.0 U	6.5 J	6.0 U	6.0 U	2.6
Vanadium	203	3.8 J	7.4 J	1.0 U	1.0 U	3.8 J	260
Zinc	1,310	18.2 J	9.1 J	10.7 J	11.2 J	32.2	11

U = The analyte was not detected above the CRDL.
J = The analyte was detected above the instrument detection limit (IDL) but below the analytical reporting limit (CRDL).
* = Drinking water Maximum Contaminant Levels (MCLs) 40 CFR § 141.11.
1 = EPA Region III April 15, 1998, Risk-Based Concentration (RBC) Standards.
signifies value in excess of RBC or MCL Standard.
NA = Not applicable.

TABLE 7
Geoprobe® Soil Sample Inorganic Analytical Results
(Concentrations in mg/kg)

Sample ID: Sample Location: Analyte	BH-1 (7' bgs) ~150' east of culvert	BH-3 (3' bgs) ~20' from SE corner of concrete dike	BH-4 (3' bgs) ~20' NW of large insulated tank	BH-5 (5' bgs) ~75' S of large maintenance building	BH-6 (6' bgs) ~15' S of west leading facility	BH-8 (4' bgs) ~25' E of SW leading facility	BH-9 (3' bgs) ~50' N of SE leading facility	BH-11 (8' bgs) ~175' NE of culvert	BH-12 (3' bgs) ~175' E of culvert	BH-16 (1' bgs) ~20' west of facility access road	BH-16 (5' bgs) ~20' west of facility access road	EPA Region III Industrial Soil Risk-Based[1] Standards
Aluminum	2,100	5,160	4,060	4,350	3,480	3,870	6,850	7,630	3,930	7,560	2,360	2,000,000
Antimony	0.42 U	0.42 U	0.39 U	0.40 U	0.41 U	0.38 U	0.35 U	0.39 U	0.42 U	0.43 U	0.39 U	820
Arsenic	26.5	5.1	11.0	4.9	21.7	7.6	4.5	12.0	13.8	9.5	21.7	38
Barium	463	128	121	119	238	88.5	76.8	101	190	177	326	140,000
Beryllium	0.24 J	0.27 J	0.30 J	0.30 J	0.33 J	0.27 J	0.37 J	0.53 J	0.31 J	0.44 J	0.21 J	4,100
Cadmium	0.42 U	0.42 U	0.39 U	0.40 U	0.41 U	0.38 U	0.35 U	0.39 U	0.42 U	0.43 U	0.39 U	1,000
Calcium	65,500	90,600	9,240	48,300	66,300	30,300	2,790	11,300	155,000	45,400	154,000	NA
Chromium	15.9	11.2	10.6	11.1	16.0	9.6	12.1	17.4	10.5	184	13.1	2,000,000
Cobalt	5.2 J	3.8 J	4.6 J	4.1 J	4.0 J	4.2 J	4.5 J	5.9 J	4.7 J	8.1	3.4 J	120,000
Copper	18.0	8.2	10.1	10.2	12.7	10.5	14.6	13.6	9.5	17.8	9.1	82,000
Iron	37,700	8,930	13,900	9,890	22,500	8,280	10,700	16,400	14,600	16,500	19,900	610,000
Lead	10.5	6.2	6.8	6.7	10.4	5.7	6.6	11.0	6.6	18.0	7.5	NA
Magnesium	7,070	21,500	4,850	8,470	8,410	8,370	3,180	6,970	23,400	16,000	8,050	NA
Manganese	341	250	346	200	327	266	296	141	358	468	222	41,000
Mercury	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.06 U	0.06 U	0.07 U	0.07 U	0.07 U	0.07 U	NA
Nickel	66.0	8.1	9.2	8.9	9.0	9.4	9.6	13.3	9.7	107	7.6	41,000
Potassium	864	1,760	1,150	1,110	1,030	921	2,490	1,940	1,470	3,170	686	NA
Selenium	0.42 U	0.42 U	0.39 U	0.40 U	0.41 U	0.38 U	0.35 U	0.39 U	0.42 U	0.43 U	0.39 U	10,000
Silver	0.28 U	0.28 U	0.26 U	0.27 U	0.27 U	0.25 U	0.23 U	0.26 U	0.28 U	0.29 U	0.26 U	10,000
Sodium	1,070	813	128 J	287 J	297 J	184 J	90.3 U	304 J	978	1,290	308 J	NA
Thallium	0.84 U	0.83 U	0.79 U	0.80 U	0.82 U	0.75 U	0.70 U	0.78 U	0.85 U	0.86 U	0.77 U	NA
Vanadium	14.9	13.5	15.8	18.0	15.4	11.3	14.1	23.2	15.2	19.0	11.1	14,000
Zinc	27.3	22.3	20.9	22.1	28.1	24.4	30.6	39.1	23.3	50.2	19.9	NA

U = The analyte was not detected above the CRDL.
J = The analyte was detected above the instrument detection limit (IDL) but below the analytical reporting limit (CRDL).
1 = EPA Region III April 15, 1998, Risk-Based Concentration (RBC) Standards.
NA = Not applicable. Results are reported on a dry weight basis.

TABLE 8
Geoprobe® Groundwater Sample - Volatile Organic Compounds Analytical Results
(Concentrations in µg/l)

Sample ID: / Sample Location: / Analyte	BH-1 ~150' east of culvert	BH-3 ~20 from SE corner of concrete dike	BH-6 ~15' South of western leading facility	BH-7 ~75' NE of SW leading facility	BH-16 ~20' west of facility access road.	SUMP East of SW leading facility
Acetone	48.	< 1000	< 100	< 10	< 10	< 50
2-Butanone	< 10	< 1000	< 200	< 10	< 10	100
Benzene	< 10	2,100	< 100	< 5	3,600	< 25
Toluene	< 10	13,000	< 100	< 5	< 5	610
Ethylbenzene	< 10	990	540	< 5	13.	< 25
m,p-Xylene	< 10	7,300	1,200	< 5	< 5	< 25
o-Xylene	< 10	1,600	< 100	< 5	2. J	< 25
Isopropylbenzene	< 10	< 500	310	2. J	26.	< 25
n-Propylbenzene	< 10	< 500	650	< 5	16.	< 25
1,2,4-Trimethylbenzene	< 10	520	2,100	< 5	< 5	< 25
1,3,5-Trimethylbenzene	< 10	310 J	910	< 5	< 5	< 25
sec-butylbenzene	5. J	< 500	200	5.	4. J	< 25
p-Isopropyltoluene	< 10	< 500	200	< 5	< 5	13. J
Naphthalene	< 10	< 500	160	< 5	< 5	< 25

J = Estimated value. Value is below quantitation limit.

TABLE 9
Geoprobe® Soil Sample - Volatile Organic Compounds Analytical Results
(Concentrations are in µg/kg)

Sample ID: / Sample Location: / Analyte	BH-1 (7' bgs) ~150' east of culvert	BH-3 (3' bgs) ~20' from SE corner of concrete dike	BH-4 (3' bgs) ~20' NW of large insulated tank	BH-5 (5' bgs) ~75' S of large maintenance building	BH-6 (6' bgs) ~15' South of western leading facility	BH-8 (4' bgs) ~25' E of SW leading facility	BH-9 (3' bgs) ~50' N of SE leading facility	BH-11 (8' bgs) ~175' NE of culvert	BH-12 (3' bgs) ~175' E of culvert	BH-16 (1' bgs) ~20' west of facility access road	BH-16 (5' bgs) ~20' west of facility access road
1,1-Dichloroethene	< 7	< 840	< 820	< 830	< 840	< 6	< 6	< 7	< 880	< 18	< 6
Acetone	320 I	< 1,700	< 1,600	< 1,700	< 1,700	< 12	< 12	<13	< 1,800	430	23.
Methylene Chloride	< 7	< 840	< 820	< 830	< 840	< 6	< 6	< 7	< 880	30.	< 6
2-Butanone	< 14	< 1,700	< 1,600	< 1,700	< 1,700	< 12	< 12	< 13	< 1,800	< 35	< 13
Benzene	2. J	63,000	10,000	190 J	< 840	< 6	< 6	< 7	5,100	< 18	78.
Trichloroethene	< 7	< 840	< 820	< 830	< 840	< 6	< 6	< 7	< 880	< 18	< 6
Toluene	< 7	270,000	800 J	< 830	< 840	< 6	11.	2. J	95,000	< 18	< 6
Chlorobenzene	< 7	< 840	< 820	< 830	< 840	< 6	< 6	< 7	< 880	< 18	< 6
Ethylbenzene	< 7	46,000	43,000	1,600	440 J	< 6	2. J	< 7	37,000	< 18	< 6
m,p-Xylene	< 7	230,000	160,000	10,000	1,300	3. J	32.	2. J	180,000	7. J	< 6
o-Xylene	< 7	75,000	76,000	1,000	< 840	< 6	11.	< 7	110,000	4. J	< 6
Isopropylbenzene	8.	8,700	11,000	460 J	2,300	< 6	< 6	< 7	8,900	< 18	3. J
n-Propylbenzene	< 7	13,000	19,000	840	7,400	< 6	< 6	< 7	12,000	< 18	< 6
tert-butylbenzene	< 7	< 840	1,300	< 830	440 J	< 6	< 6	< 7	2,400	< 18	< 6
1,2,3-Trichloropropane	< 7	< 840	< 820	< 830	< 840	< 6	< 6	19.	< 880	< 18	< 6
1,2,4-Trimethylbenzene	< 7	69,000	80,000	4,800	13,000	< 6	< 6	< 7	110,000	8. J	< 6
1,3,5-Trimethylbenzene	< 7	47,000	56,000	2,300	4,800	< 6	< 6	< 7	97,000	22.	< 6
sec-butylbenzene	53.	3,300	5,800	310 J	2,200	< 6	< 6	< 7	5,000	< 18	< 6
p-Isopropyltoluene	< 7	4,000	6,100	360 J	2,500	< 6	< 6	5. J	12,000	< 18	< 6
1,2,4-Trichlorobenzene	< 7	< 840	< 820	< 830	< 840	< 6	< 6	3. J	< 880	< 18	< 6
Naphthalene	< 7	5,300	6,300	440 J	< 840	< 6	< 6	12.	10,000	11. J	< 6
Percent Moisture (%)	30	26	24	25	26	19	17	25	29	29	22

Results are reported on a dry weight basis.
J = Estimated value. Value is below quantitation limit.
I = Results biased high due to co-elution.

TABLE 10
Tank Samples - TCLP Metals (ICAP) and VOC Analytical Results (October 27-29, 1998)
(Concentrations in mg/L)

Sample ID: Location: Analyte		RJ-TB-01 Tank #7 cream colored "empty" tank - southeast portion of site	RJ-TB-02 Unpainted large east tank with crude oil	RJ-TB-03 Tank A5	RJ-TB-04 Tank K	TCLP* Standard
Arsenic	As	<0.18	0.0446	0.529	< 0.37	5.0
Barium	Ba	3.81	3.03	2.36	0.263	100.0
Cadmium	Cd	<0.013	<0.0027	<0.027	<0.027	1.0
Chromium	Cr	0.105	0.00414	<0.019	<0.019	5.0
Lead	Pb	<0.114	0.798	<0.22	<0.228	5.0
Selenium	Se	1.02	<0.065761	4.51	7.08	1.0
Silver	Ag	<0.015	<0.003	<0.03	<0.03	5.0
VOCs (remaining VOCs were reported as non-detect for all samples)						
Benzene		ND	0.011 J	0.010 J	ND	0.5

* = 40 CFR § 261.24.
J = Estimated value. Value is below quantitation limit.
ND = Not detected at the reported limit.

TABLE 11
Groundwater and IDW Inorganic Analytical Results (October 27-29, 1998)
(Concentrations in μg/L)

Sample ID: / Location: / Analyte	RJ-GW-01 MW-1	RJ-GW-02 MW-2	RJ-GW-03 MW-3	RJ-GW-04 MW-4	RJ-GW-05 MW-5	RJ-GW-06 (MW-2 duplicate)	RJ-IDW-01 (mg/kg) Drill cuttings composite	RJ-DW-01 Development and purge water composite	Risk-Based[1] Concentration and MCL Standards
Aluminum (Al)	18,300	92,700	10,500	19,900	3,710	45,000	-	-	32,000
Antimony (Sb)	<60.9 U	<60.9 U	<60.9 U	<60.9 U	<60.9 U	<60.9 U	-	-	15
Arsenic (As)	106	114	65.8	44.0 J	<37.3 U	154	-	-	50*
Barium (Ba)	3390	3050	4020	2680	2330	1900	-	-	1,000*
Beryllium (Be)	1.71 J	5.46	<1.24 U	<1.24 U	<1.24 U	2.58 J	-	-	73
Cadmium (Cd)	<2.7 U	<2.7 U	<2.7 U	<2.7 U	<2.7 U	3.79 J	-	-	10*
Calcium (Ca)	272,000	461,000	215,000	216,000	202,000	249,000	-	-	NA
Chromium (Cr)	46.8	193	8.70 J	46.6	<1.98 U	92.1	-	-	50*
Cobalt (Co)	19.0 J	66.8	5.29 J	11.5 J	<2.67 U	31.5	-	-	2,200
Copper (Cu)	38.3	173	15.9	22.3	14.8	78.9	-	-	1,500
Iron (Fe)	88,200	128,000	11,500	26,700	4,850	63,900	-	-	11,000
Lead (Pb)	27.8 J	108	<22.8 U	24.7 J	<22.8 U	74.9	56.3	<22.8 U	NA
Magnesium (Mg)	141,000	310,000	213,000	240,000	198,000	268,000	-	-	NA
Manganese (Mn)	2,930	3,820	564	526	200	1,910	-	-	5,100

TABLE 11
Groundwater and IDW Inorganic Analytical Results (October 27-29, 1998)
(Concentrations in µg/L)
(continued)

Sample ID: / Location: / Analyte		RJ-GW-01 MW-1	RJ-GW-02 MW-2	RJ-GW-03 MW-3	RJ-GW-04 MW-4	RJ-GW-05 MW-5	RJ-GW-06 (MW-2 duplicate)	RJ-IDW-01 (mg/kg) Drill cuttings composite	RJ-DW-01 Development and purge water composite	Risk-Based[1] Concentration and MCL Standards
Nickel	(Ni)	35.2 J	162	<17.2 U	<17.2 U	<17.2 U	65.0	-	-	730
Potassium	(K)	28,300	37,900	14,800	11,900	11,100	24,800	-	-	NA
Selenium	(Se)	154	134	<65.7 U	<65.7 U	<65.7 U	117	-	-	10*
Silver	(Ag)	<3.0 U	<3.0 U	<3.0 U	<3.0 U	<3.0 U	<3.0 U	-	-	50*
Sodium	(Na)	472,000	596,000	565,000	638,000	543,000	587,000	-	-	NA
Thallium	(Tl)	378	784	312	507	152	578	-	-	2.6
Vanadium	(V)	47.3 J	152	19.2 J	52.7	6.68 J	86.8	-	-	260
Zinc	(Zn)	99.8	381	41.7	71.0	18.2	184	-	-	11

J = Analyte was detected above the instrument detection limit (IDL) but below the analytical reporting limit (CRDL).
U = The analyte was not detected above the CRDL.
1 = EPA Region III April 15, 1998, Risk-Based Concentration (RBC) Standards.
* = Drinking water Maximum Contaminant Levels (MCLs) 40 CFR § 141.11.
- = Not tested.
▒▒ signifies value in excess of RBC or MCL Standard.

TABLE 12
Groundwater Samples - Volatile Organic Compounds Analytical Results (October 27-29, 1998)
(Concentrations in µg/L)

Sample ID: Location: Analyte	RJ-GW-01 MW-1	RJ-GW-02 MW-2	RJ-GW-03 MW-3	RJ-GW-04 MW-4	RJ-GW-05 MW-5	RJ-GW-06 MW-2 duplicate	RJ-IDW-01 (mg/kg) Drill cuttings composite	RJ-DW-01 Development and purge water composite
Benzene	12,000	1,700	ND	ND	ND	1,800	-	2,000
TEPH	-	-	-	-	-	-	5.5	-
TVPH	-	-	-	-	-	-	420	-
n-Butylbenzene	14 J	15 J	ND	ND	ND	13 J	-	-
Ethylbenzene	1,400	1,400	ND	ND	1.8 J	1,300	-	520
Isopropylbenzene	100	120	ND	ND	ND	110	-	-
p-Isopropyltoluene	15 J	22 J	ND	ND	ND	19 J	-	-
Naphthalene	65	160	ND	ND	ND	160	-	-
n-Propylbenzene	120	140	ND	ND	ND	140	-	-
Toluene	16,000	1,500	ND	ND	1.3 J	1,500	-	3,000
1,2,4-Trimethylbenzene	870	1,100	ND	ND	1.3 J	980	-	-
1,3,5-Trimethylbenzene	480	590	ND	ND	1.0 J	500	-	-
Xylenes (total)	12,000	10,000	ND	ND	ND	11,000	-	8,000

ND = Not detected at the reported limit.
J = Analyte was detected above the instrument detection limit (IDL) but below the analytical reporting limit (CRQL).

APPENDIX A

Photolog

Color Photo(s)

The following pages contain color that does not appear in the scanned images.

To view the actual images, please contact the Superfund Records Center at (303) 312-6473.

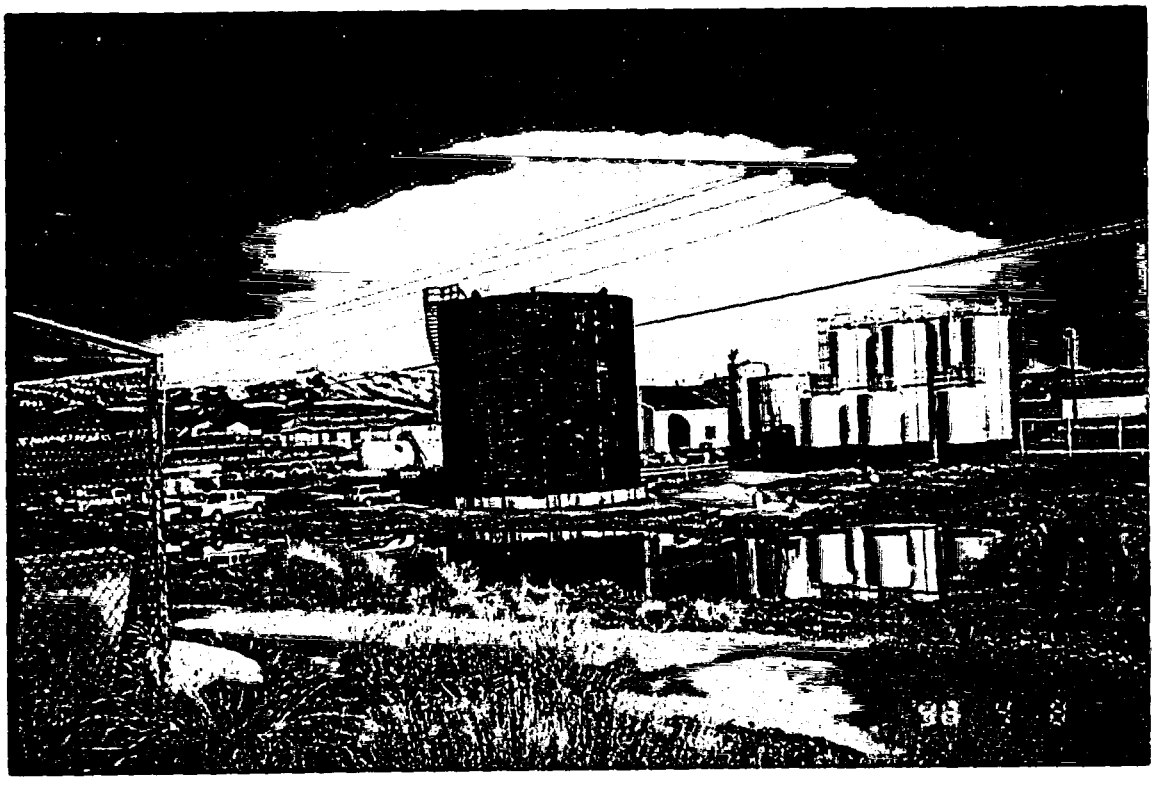

PHOTO 1

Facing northwest - view of northeast tank farm. Process equipment is located behind tanks.

PHOTO 2

Facing south - quonset hut with chemical storage on left and southwest tank farm on the right.

PHOTO 3
Facing southeast - view of northeast and southeast tank farms.

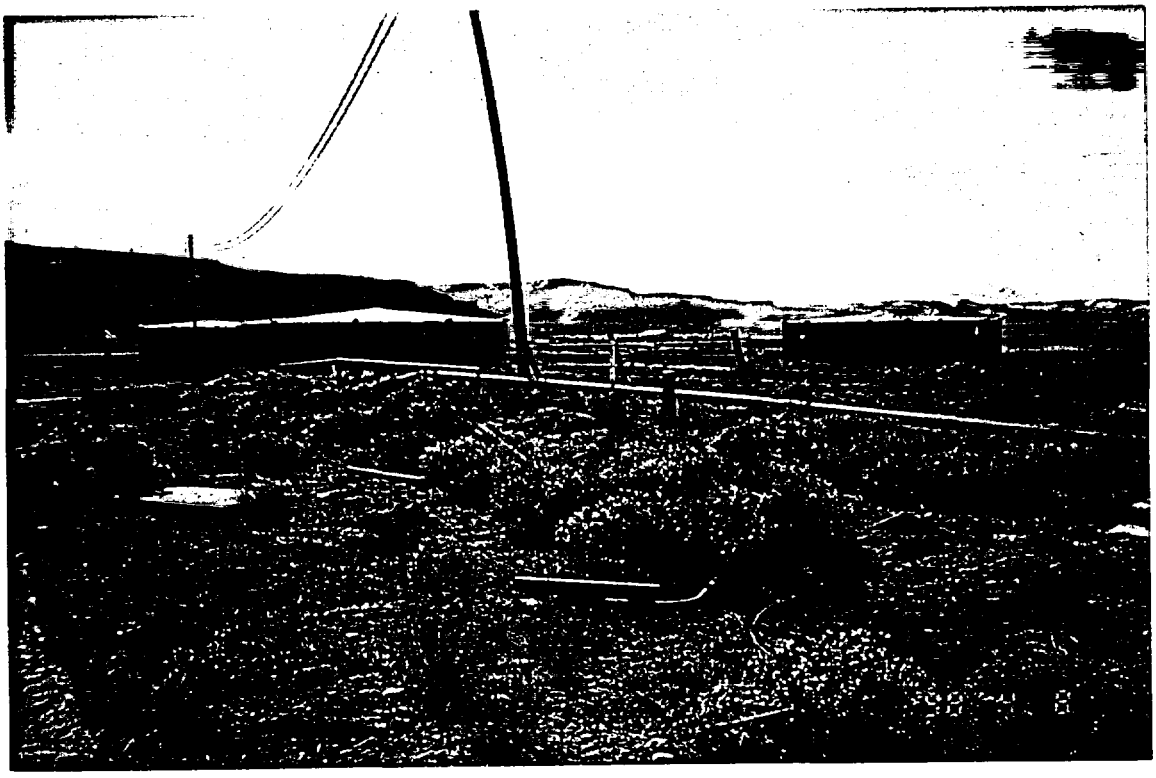

PHOTO 4
Facing east-southeast - view of "new" large tank farm on the southeast portion of the property.

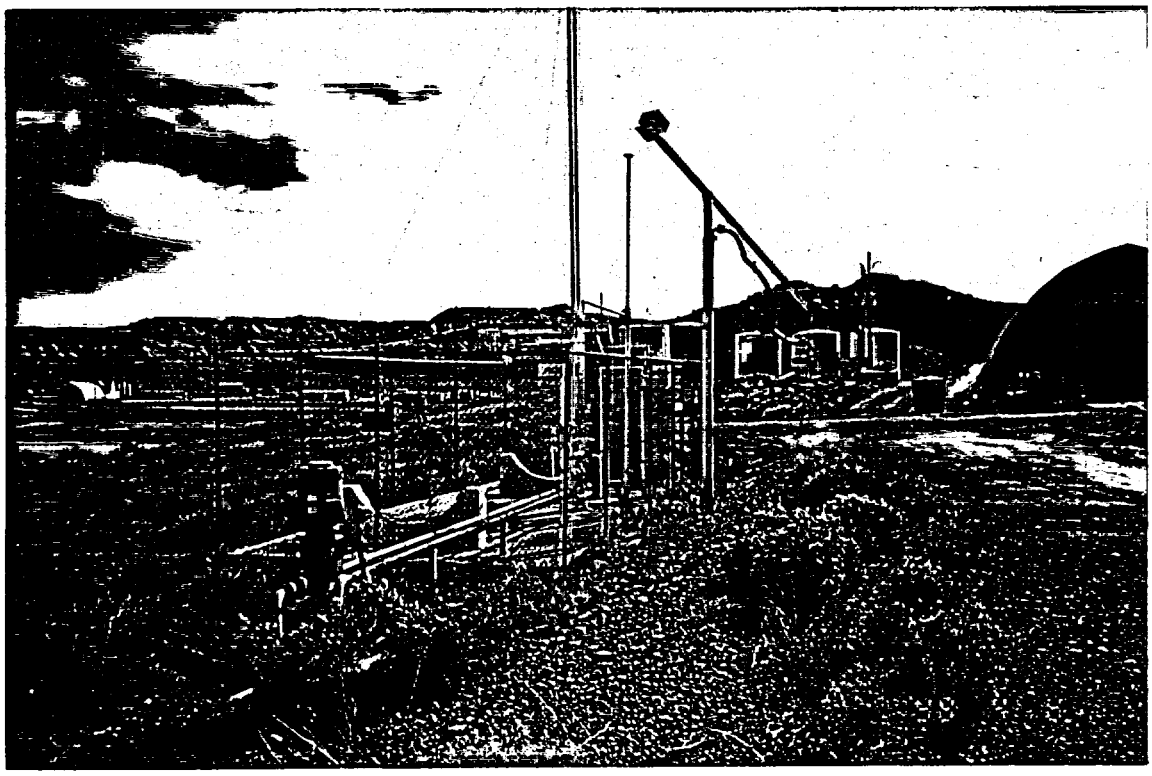

PHOTO 5
Facing east - view of southwest leading facility.

PHOTO 6
Facing northwest - view of the fire water pond. Drum excavation is located on the left.

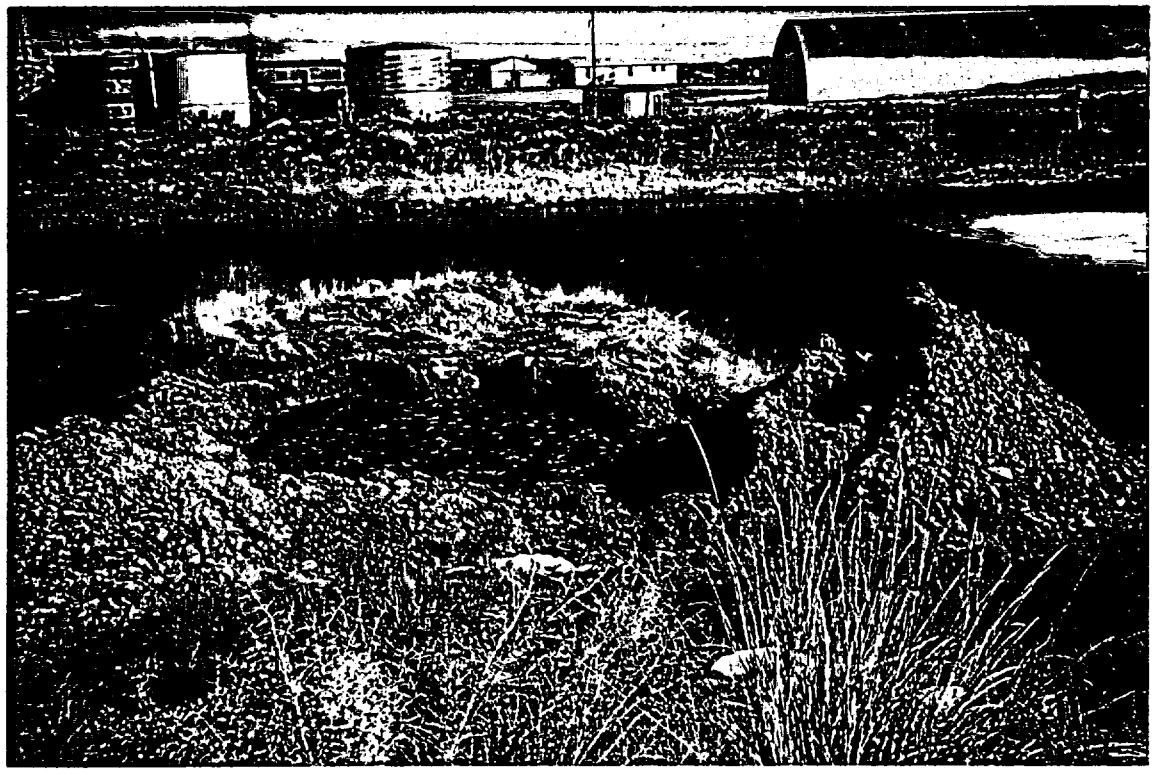

PHOTO 7
Facing north - excavation of two drums.

PHOTO 8
Facing southwest - area south of the fire water pond.

PHOTO 9
Facing south - leaking drum in the bone yard southwest of the southwest tank farm.

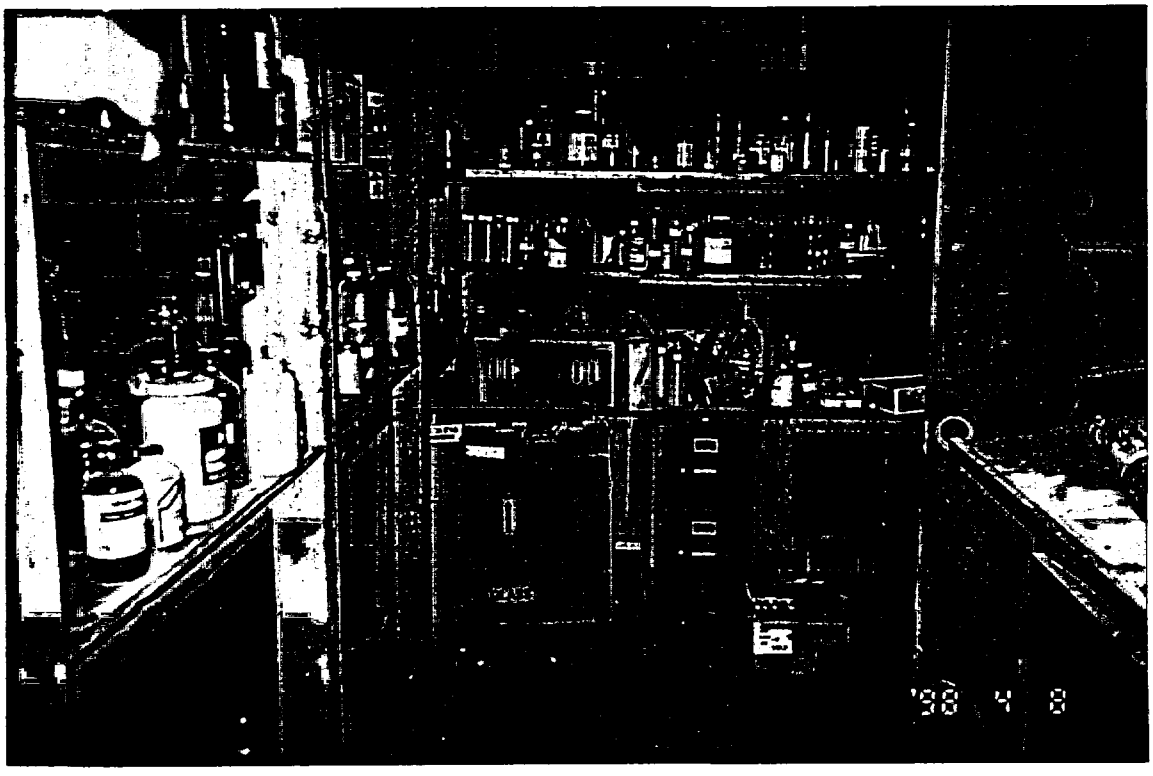

PHOTO 10
Chemical storage located in the quonset hut.

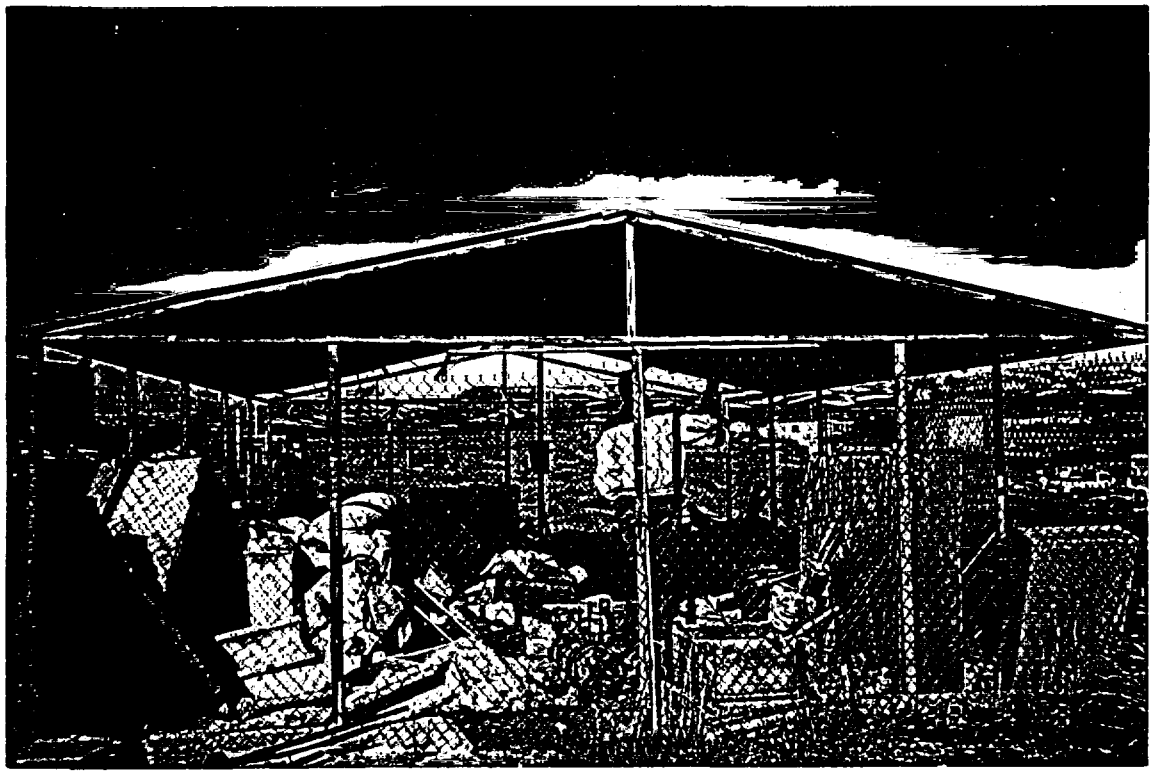

PHOTO 11
Facing west - sample RJ-AS-01 location from the southeast leading facility.

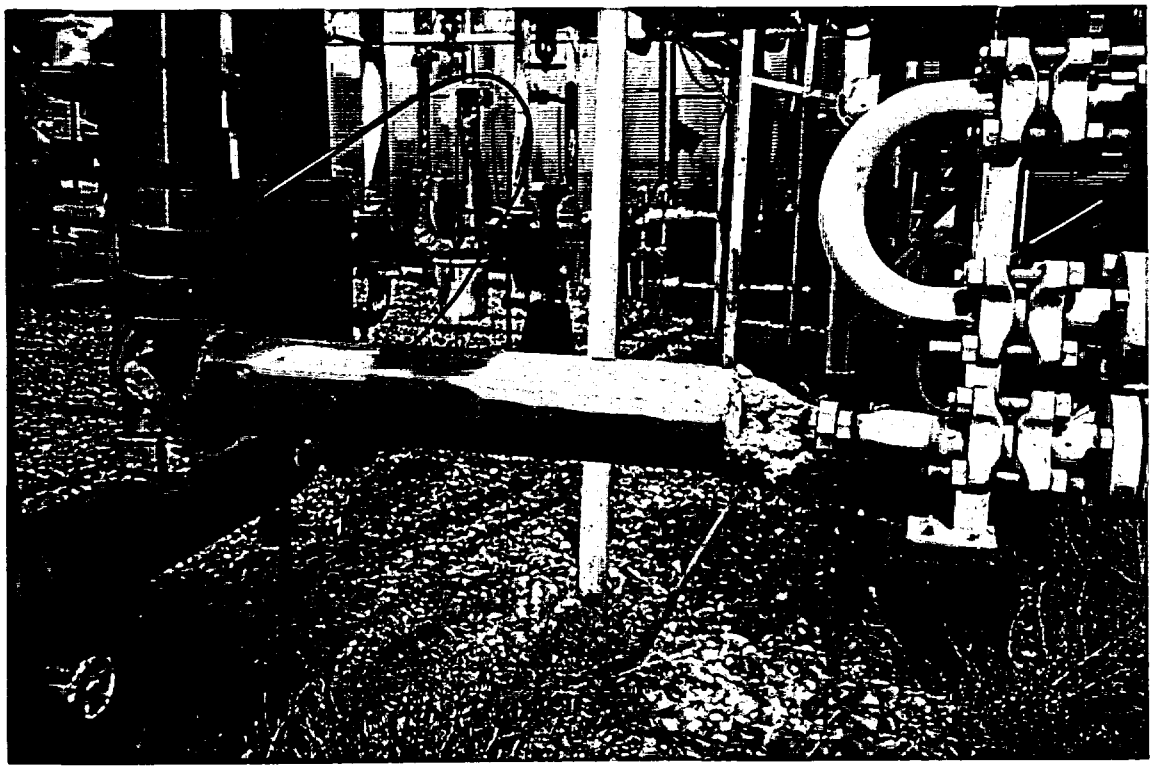

PHOTO 12
Facing north - sample RJ-AS-02 location from the process area.

PHOTO 13
Facing northeast - sample RJ-PR-01 location from blue drum on northeast leading facility pad.

PHOTO 14
Facing east - sample RJ-PR-02 location of a sheen on water seepage.

PHOTO 15
RJ-SO-01 sample location - stained soil around the northeast leading facility.

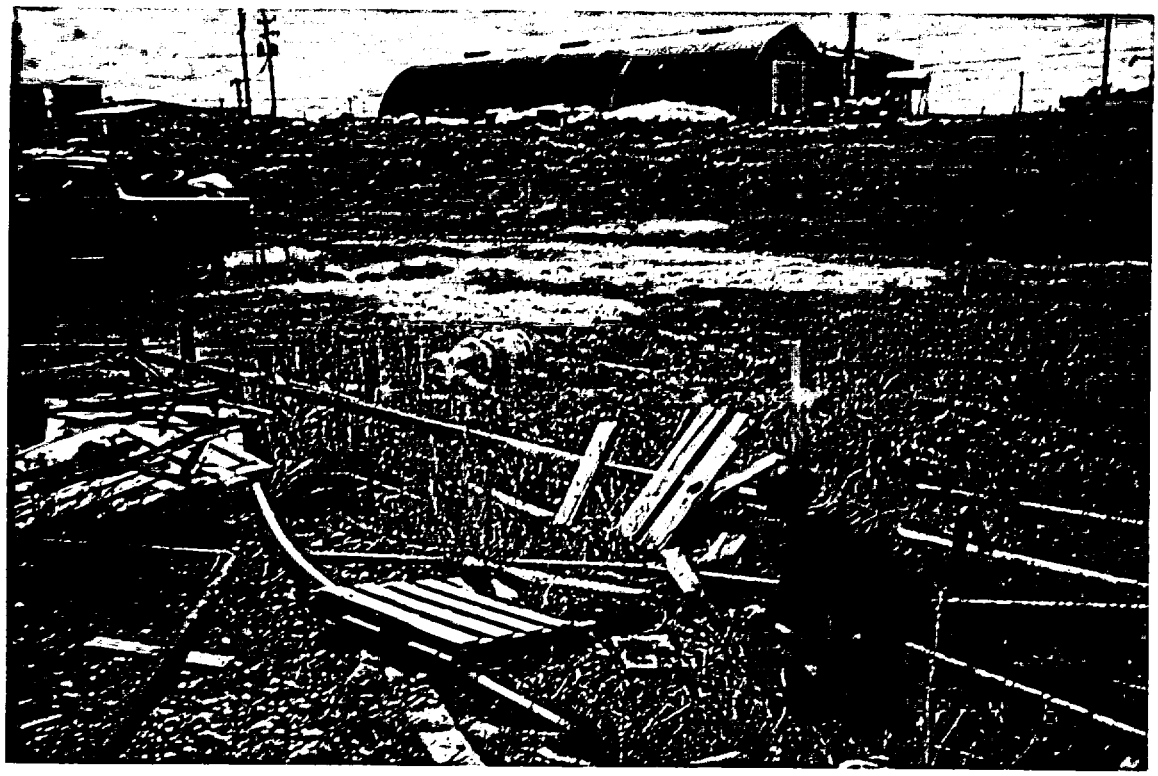

PHOTO 16
Facing southeast - RJ-SO-02 and RJ-SO-03 sample locations at the west leading facility.

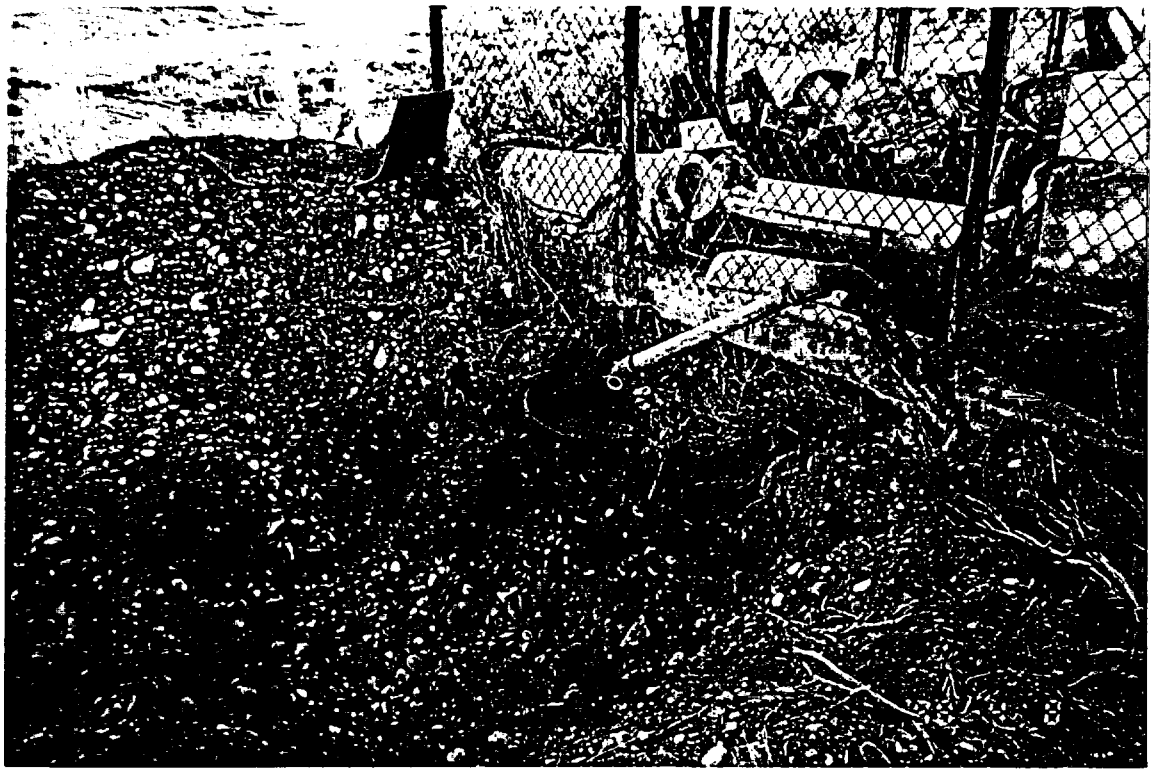

PHOTO 17

Facing southeast - RJ-SO-04 sample location from excavation on the west side of the southeast leading facility.

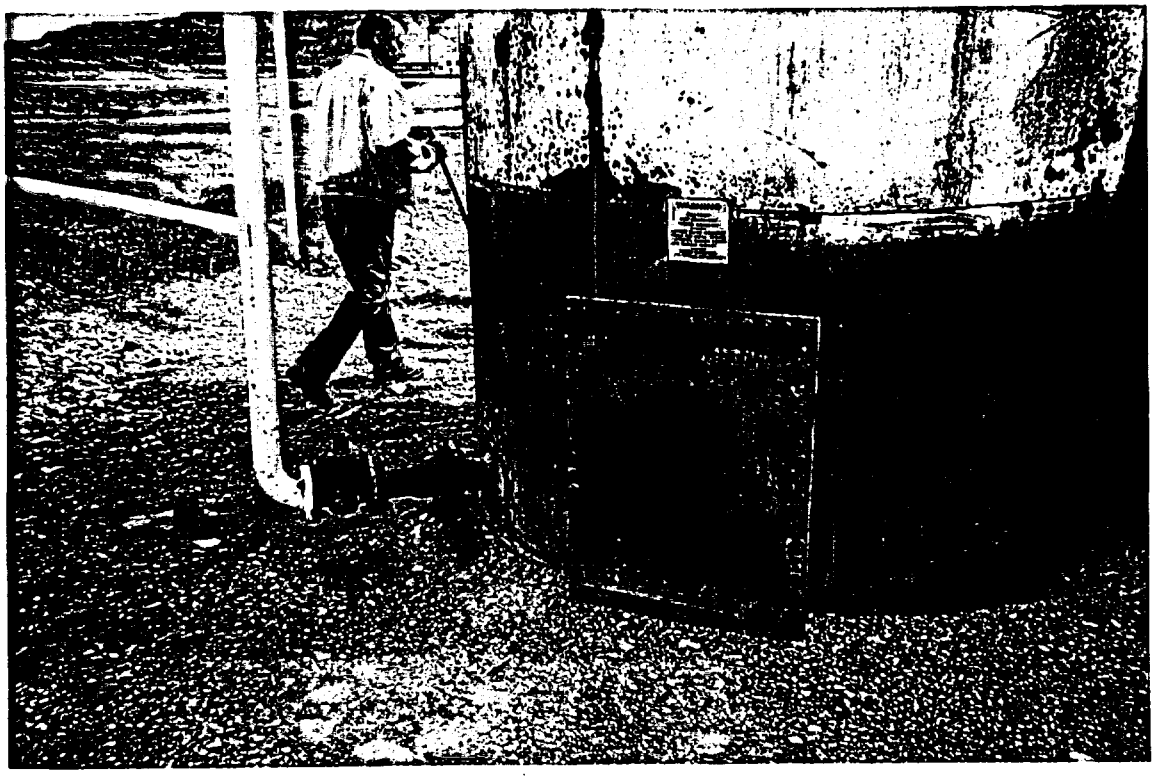

PHOTO 18

Facing southeast - RJ-SO-05 sample location around tank at north tank farm.

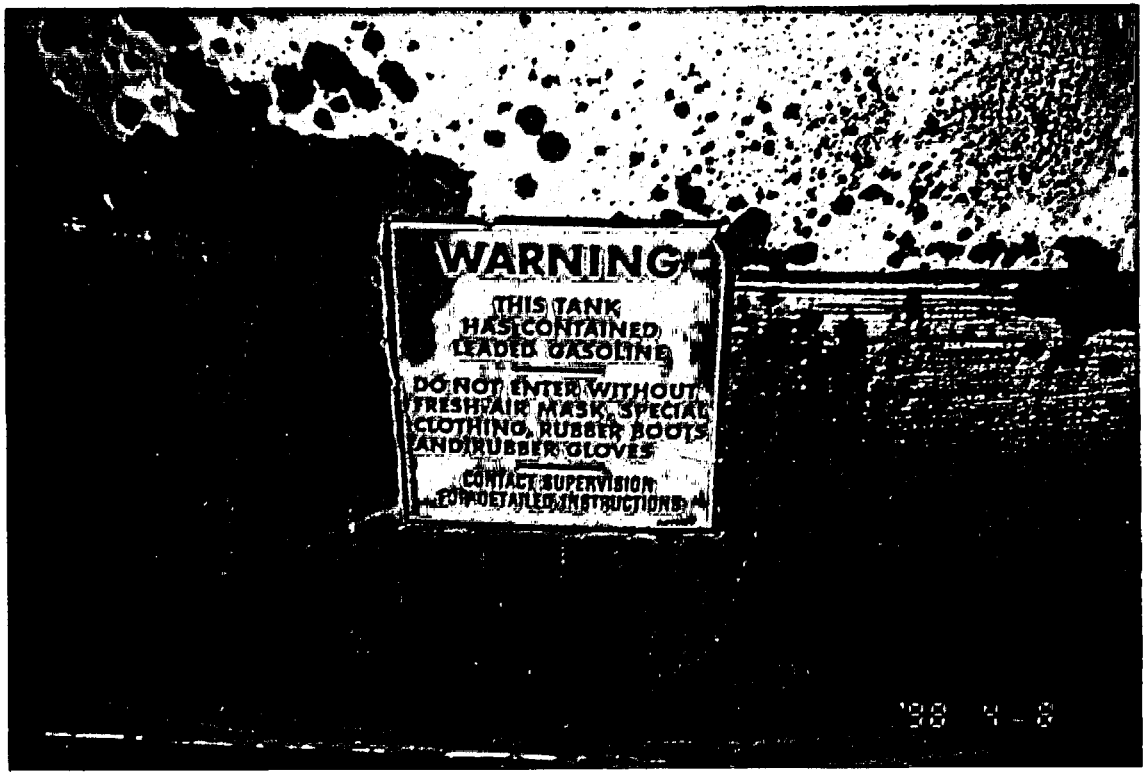

PHOTO 19
Close-up of label on tank in Photo 18.

PHOTO 20
Facing south - RJ-SO-06 sample location near fire water pond where two drums were excavated.

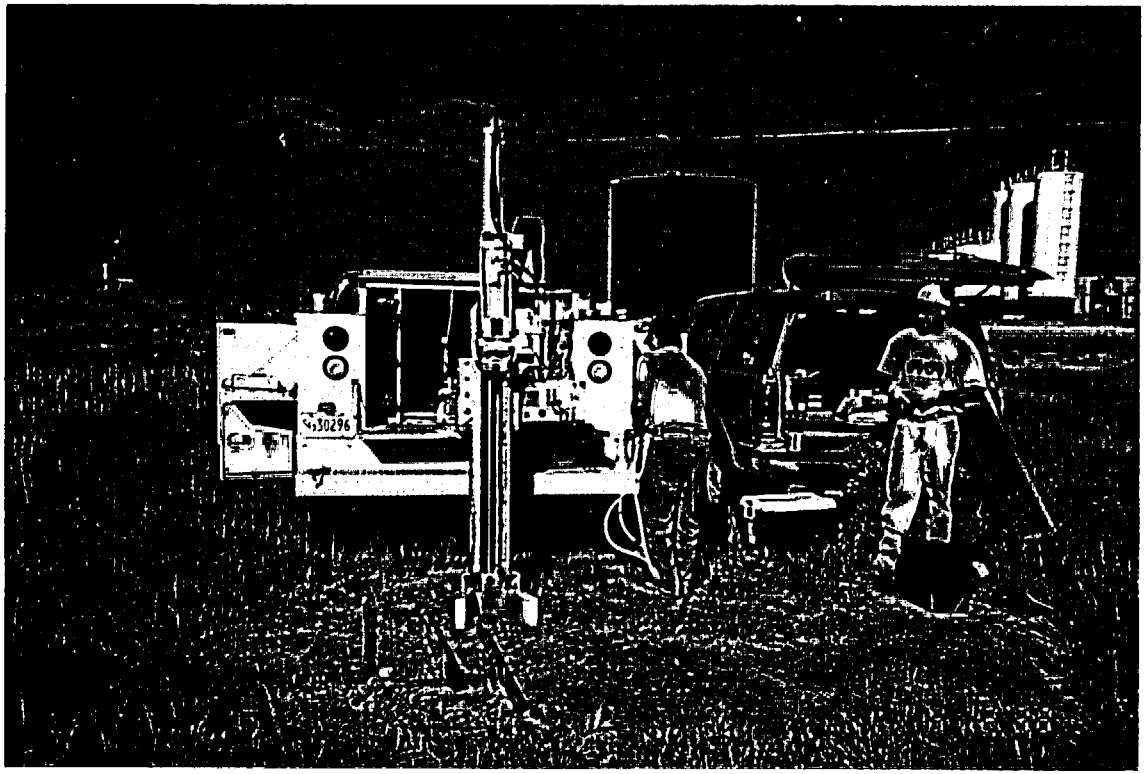

PHOTO 21
Facing west - Borehole 1 Geoprobe® location.

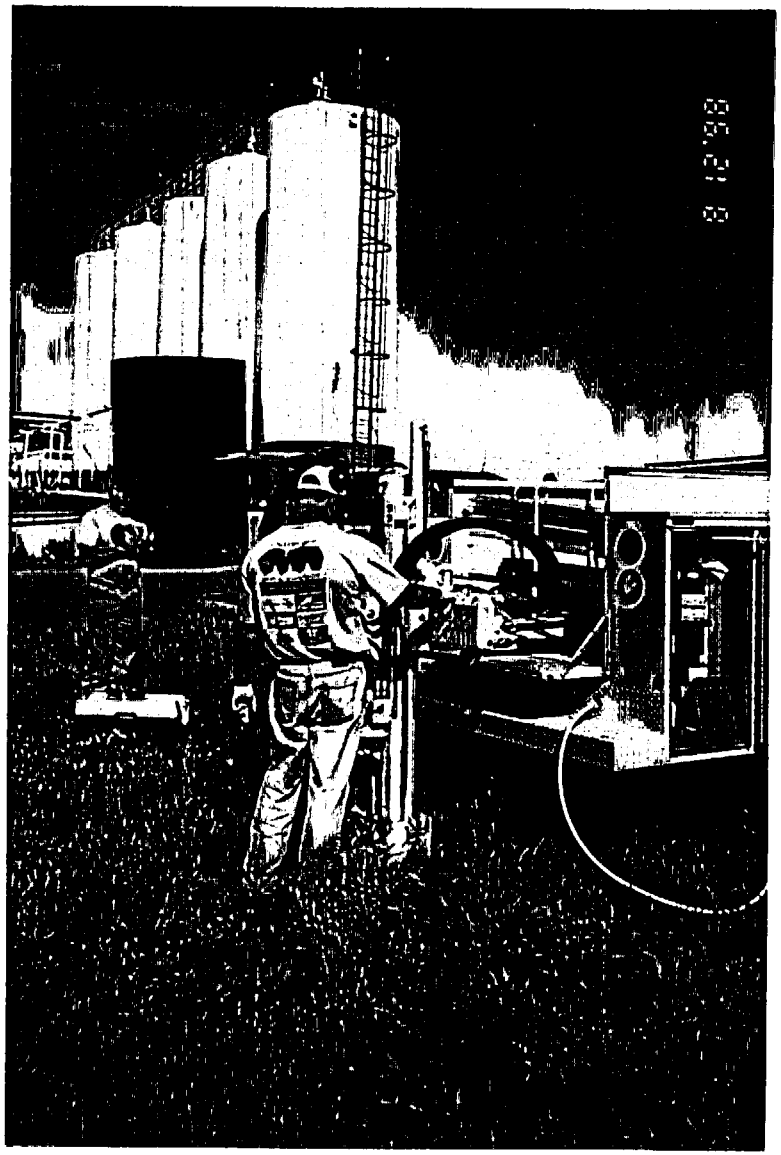

PHOTO 22
Facing west - Borehole 2 Geoprobe® location.

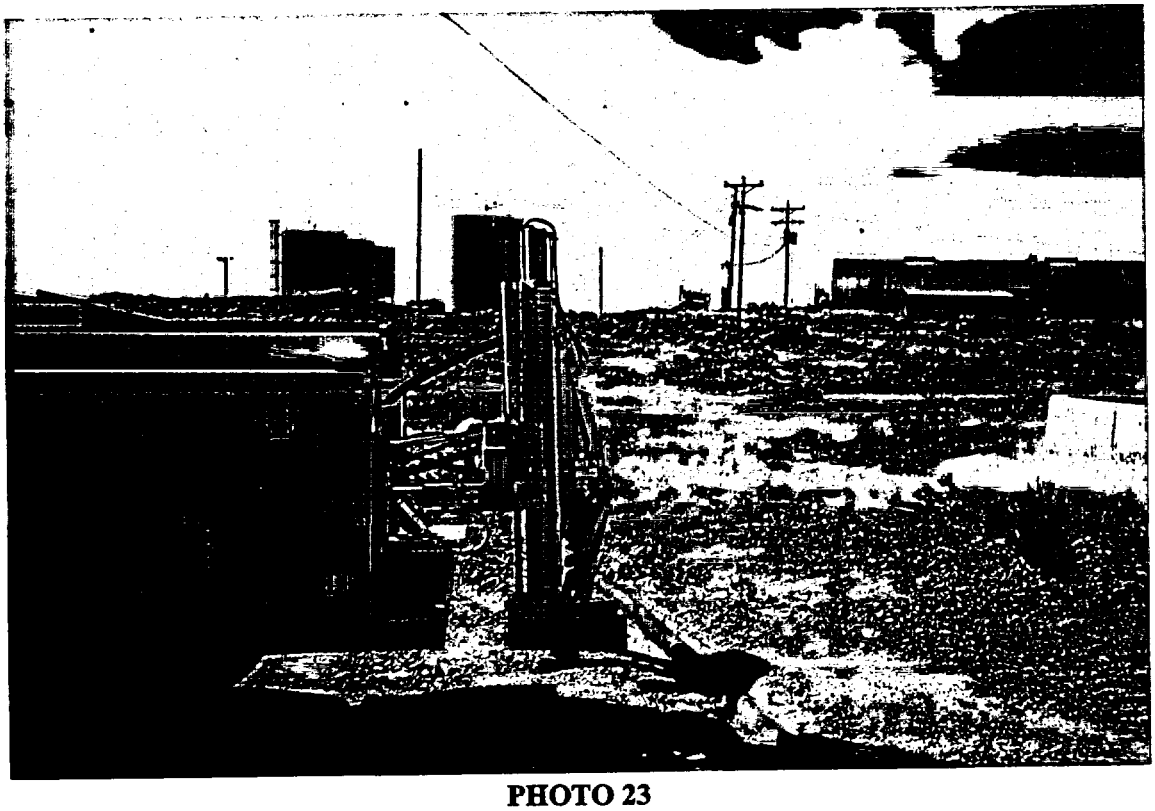

PHOTO 23
Facing south - Borehole 3 Geoprobe® location.

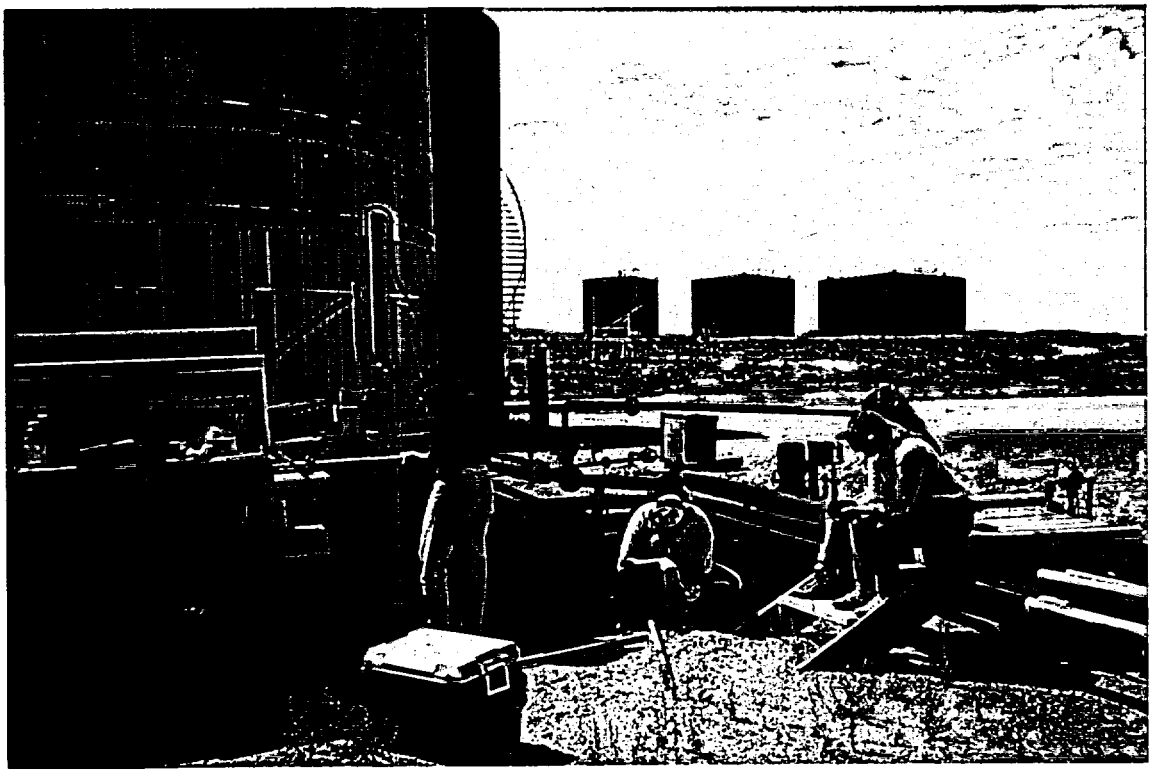

PHOTO 24
Facing south - Borehole 4 Geoprobe® location.

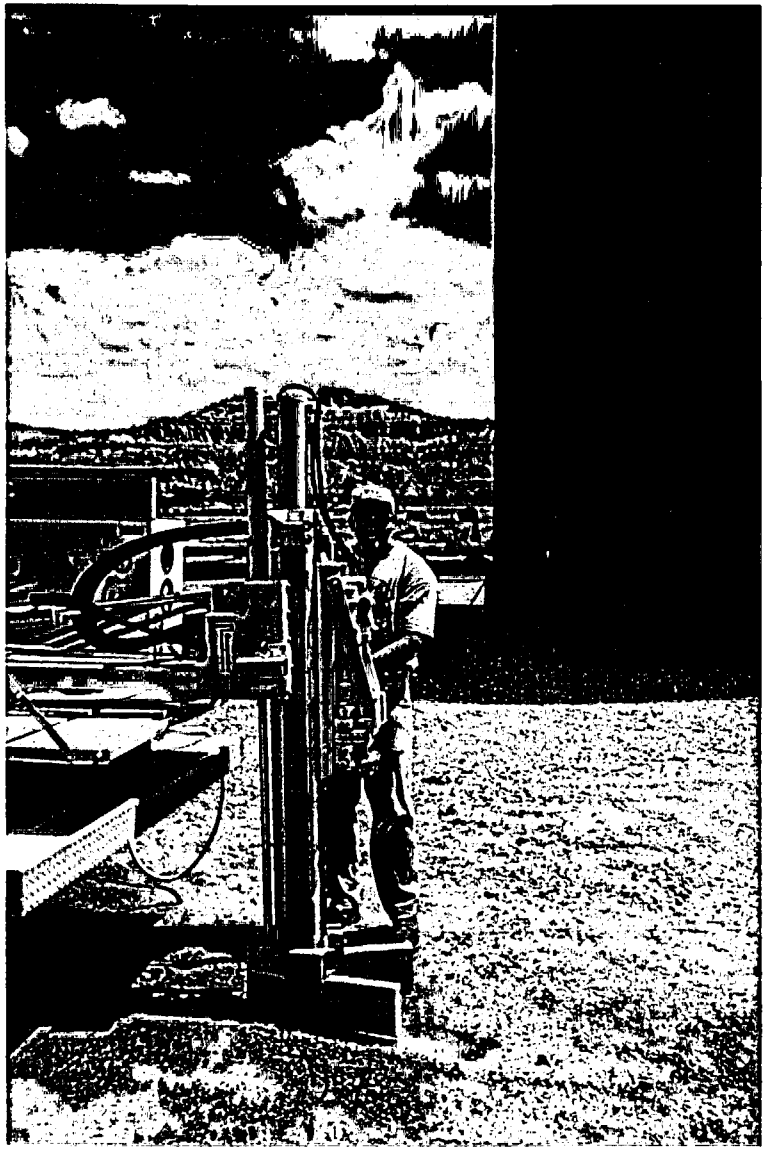

PHOTO 25
Facing east - Borehole 5 Geoprobe® location.

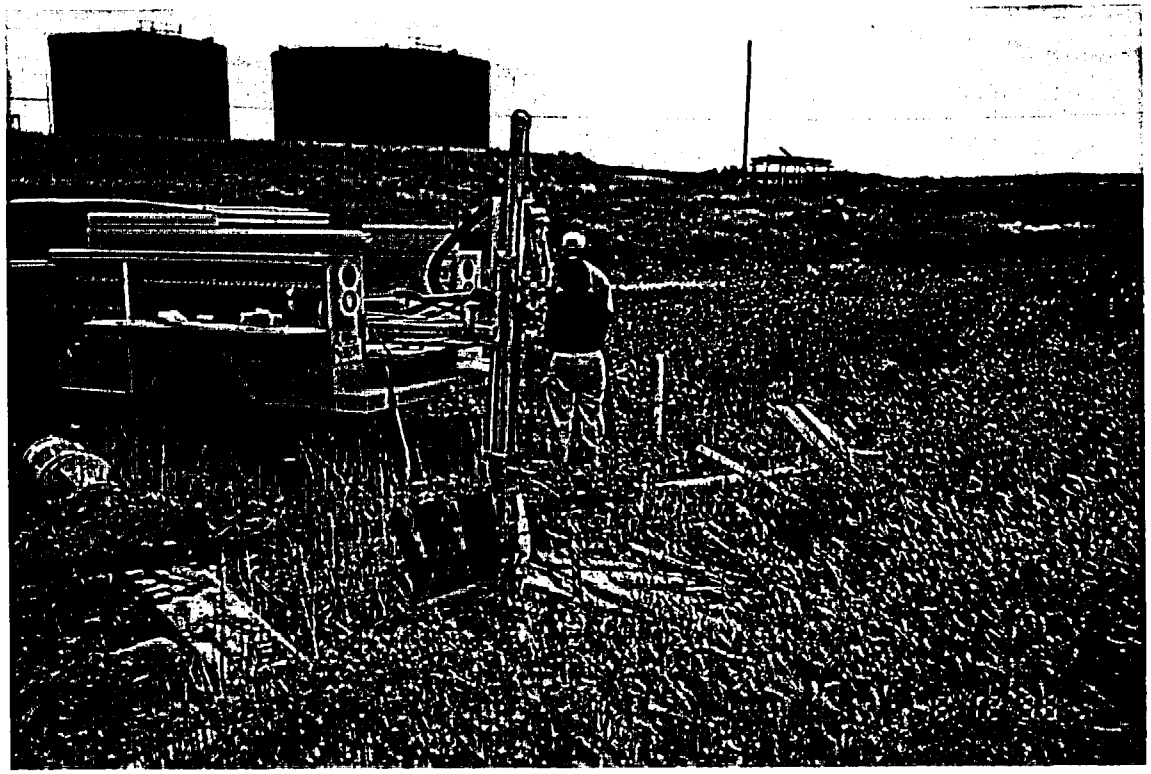

PHOTO 26
Facing southwest - Borehole 6 Geoprobe® location.

PHOTO 27
Facing northeast - Borehole 7 Geoprobe® location.

PHOTO 28
Facing north - Borehole 8 Geoprobe® location.

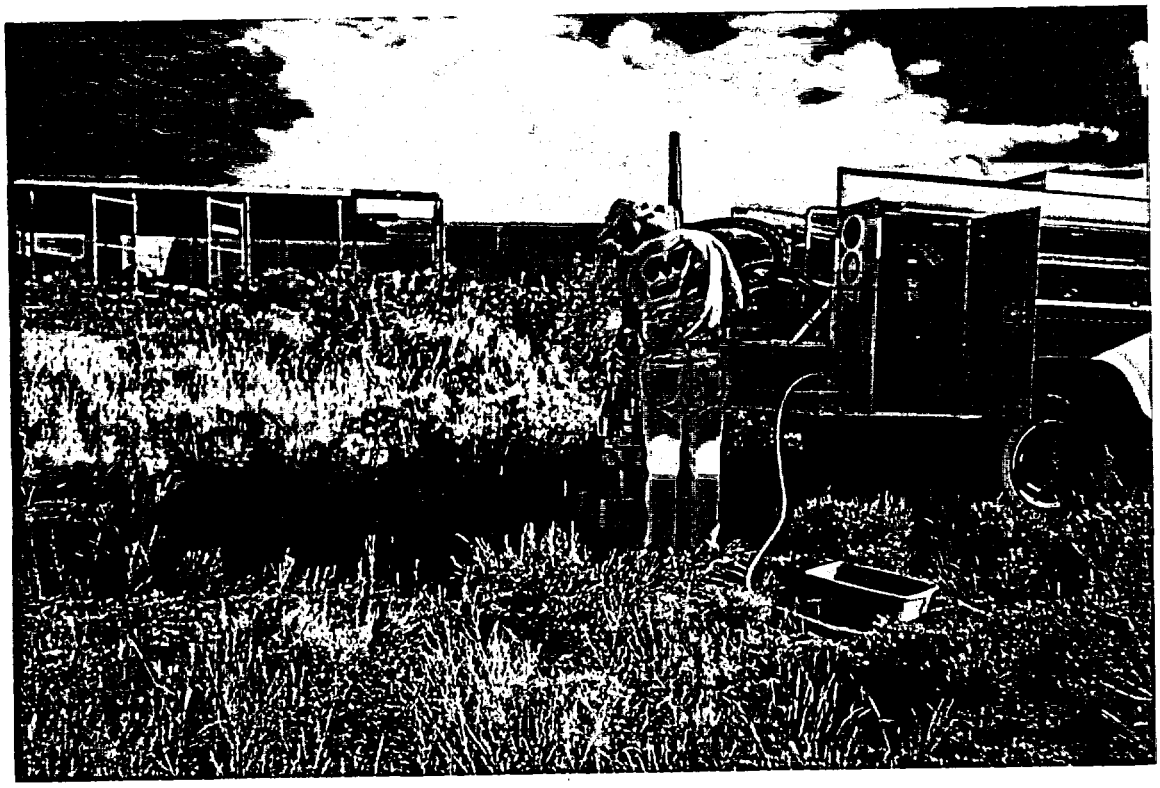

PHOTO 29
Facing south - Borehole 9 Geoprobe® location.

PHOTO 30
Facing west - Borehole 10 Geoprobe® location.

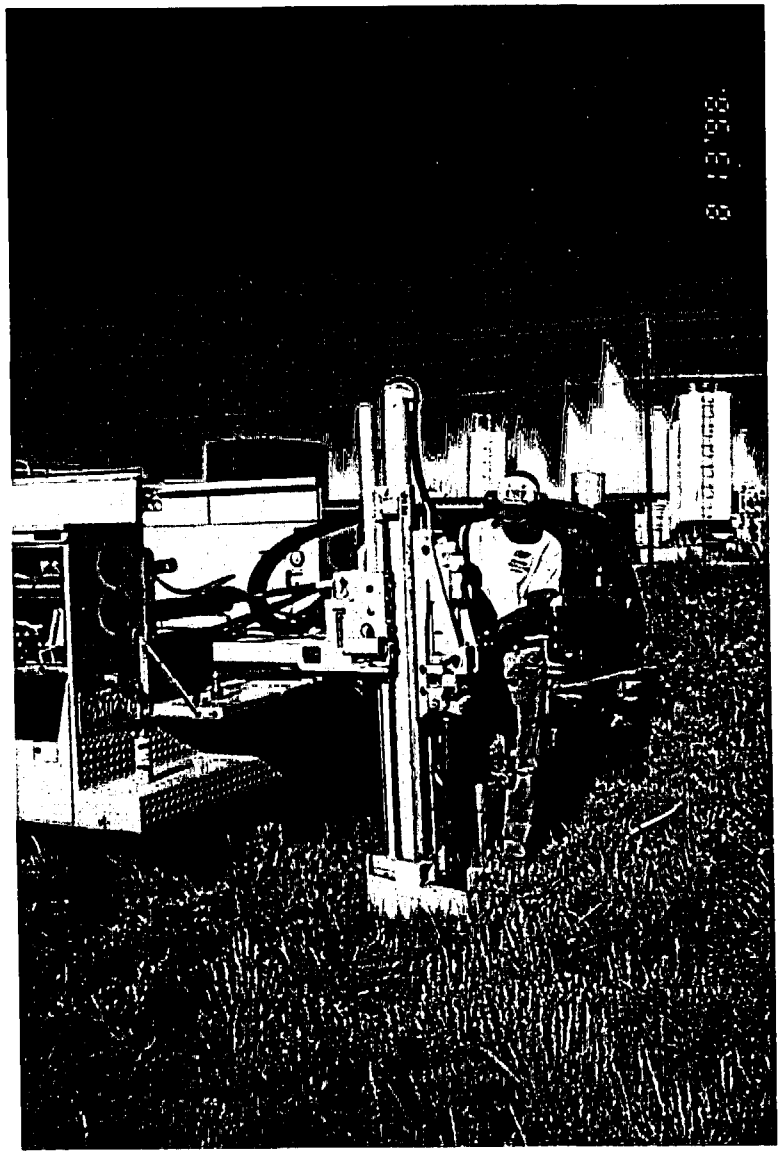

PHOTO 31
Facing west - Borehole 11 Geoprobe® location.

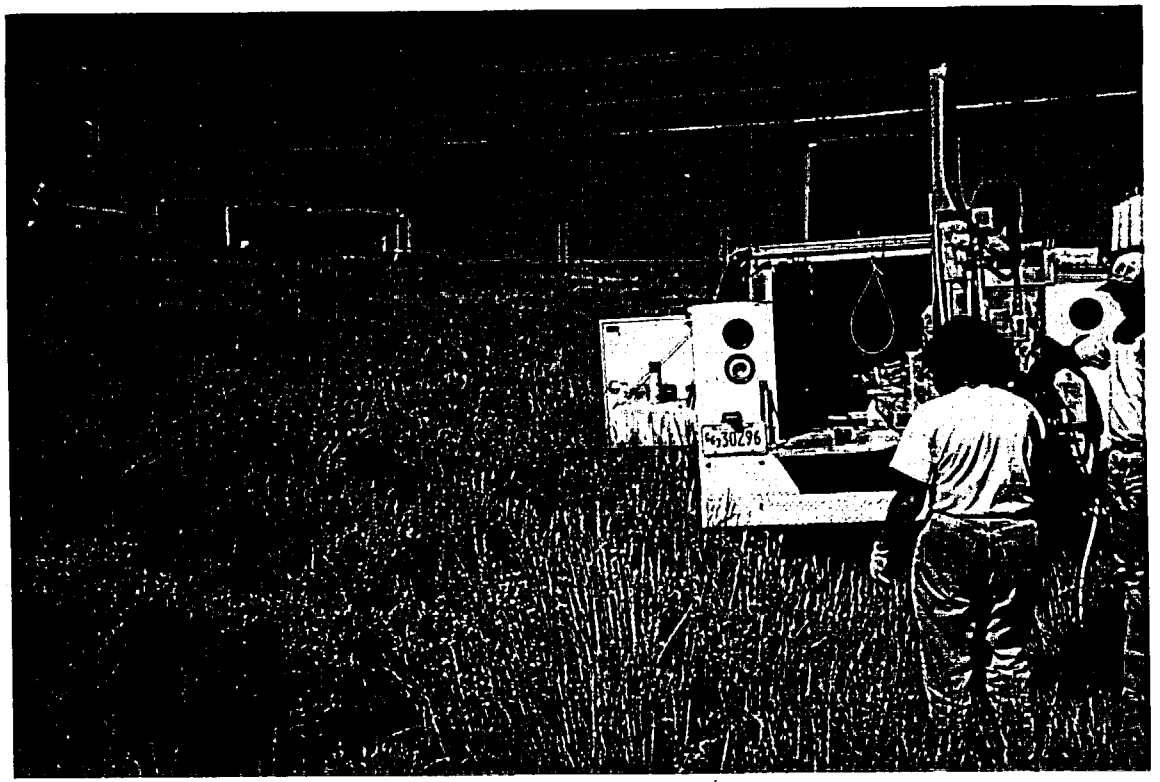

PHOTO 32
Facing southwest - Borehole 12 Geoprobe® location.

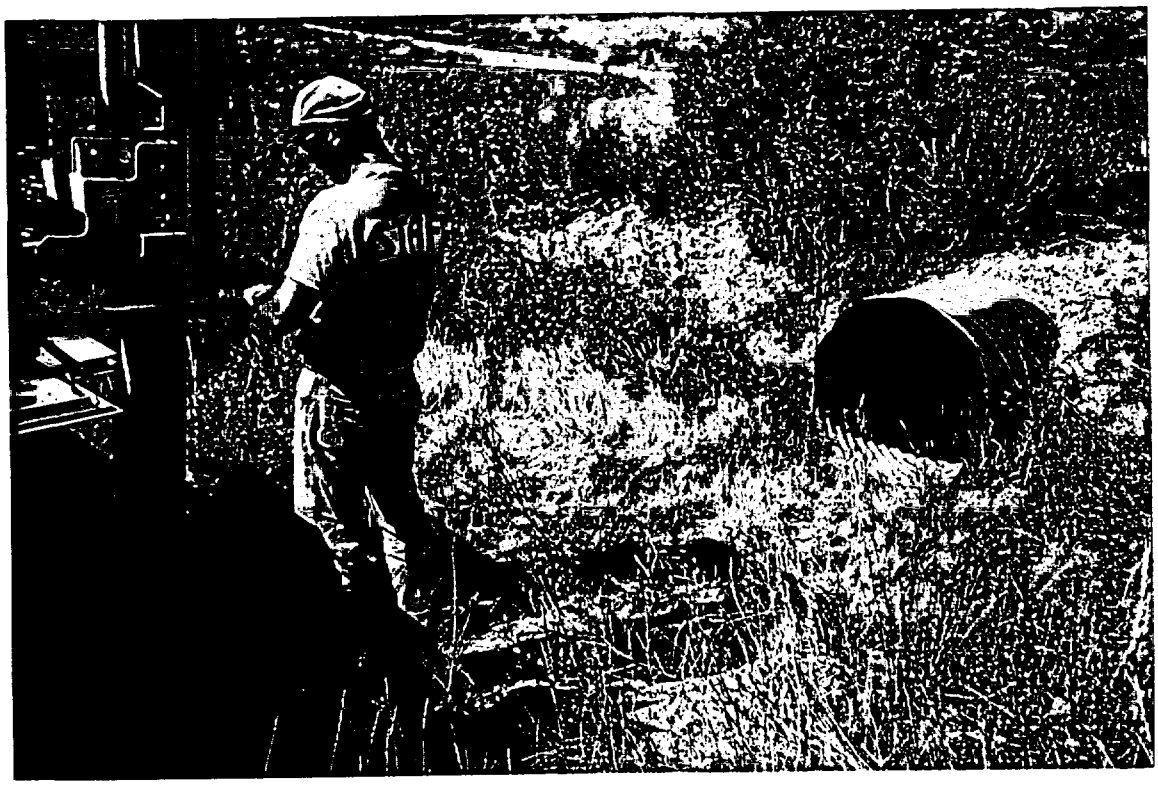

PHOTO 33
Facing southwest - Borehole 13 Geoprobe® location.

PHOTO 34
Facing west - Borehole 14 Geoprobe® location.

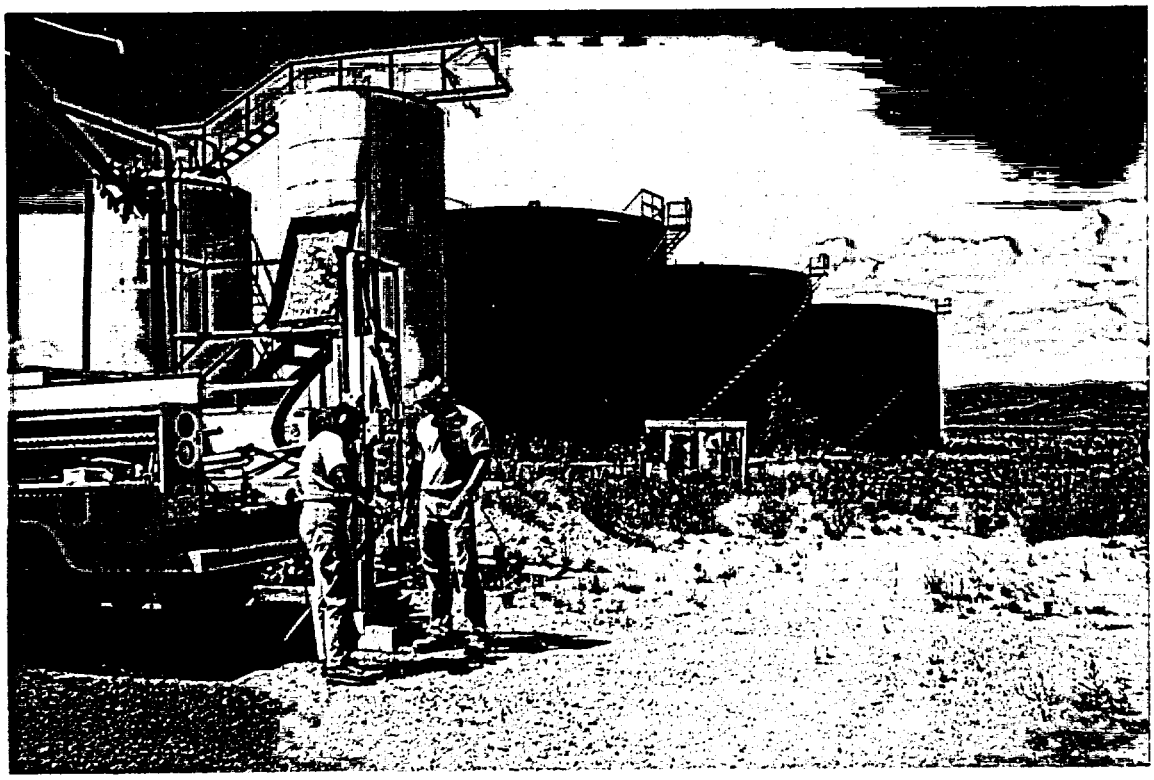

PHOTO 35
Facing west - Borehole 15 Geoprobe® location.

PHOTO 36
Facing west - Borehole 17 Geoprobe® location.

PHOTO 37
Facing west-northwest - Sump sample near southwest leading facility.

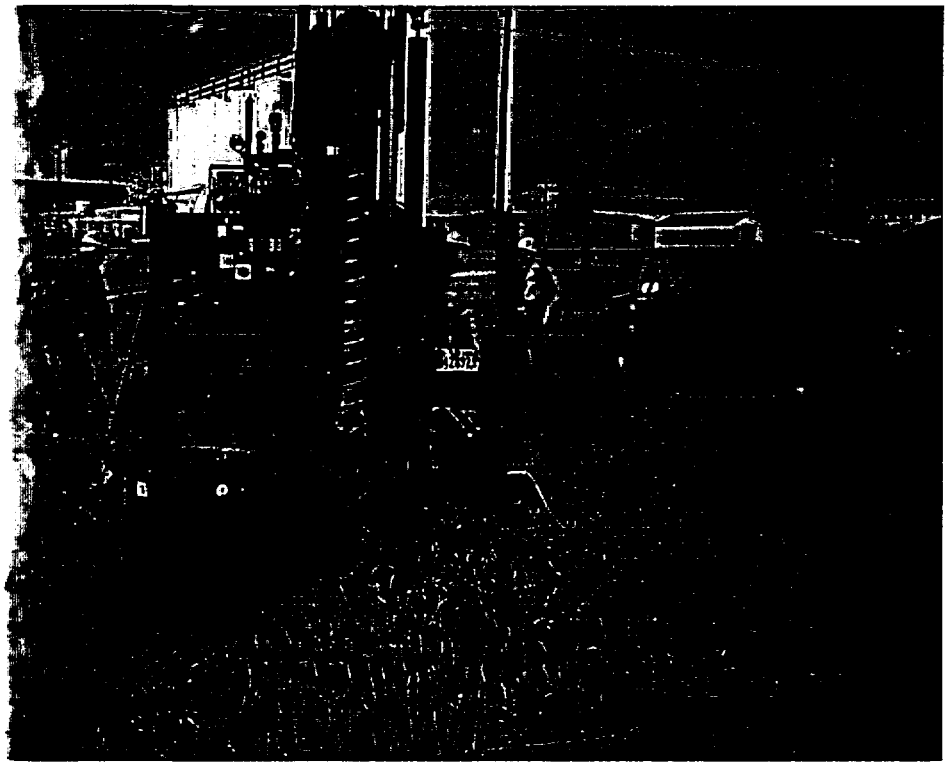

PHOTO 38
Facing west, view of Quality Remediation drilling rig at the location of monitoring well MW-1.

PHOTO 39
MW-1 stained soil from five to six feet below ground surface.

PHOTO 40
Facing northeast, view of MW-3 location.

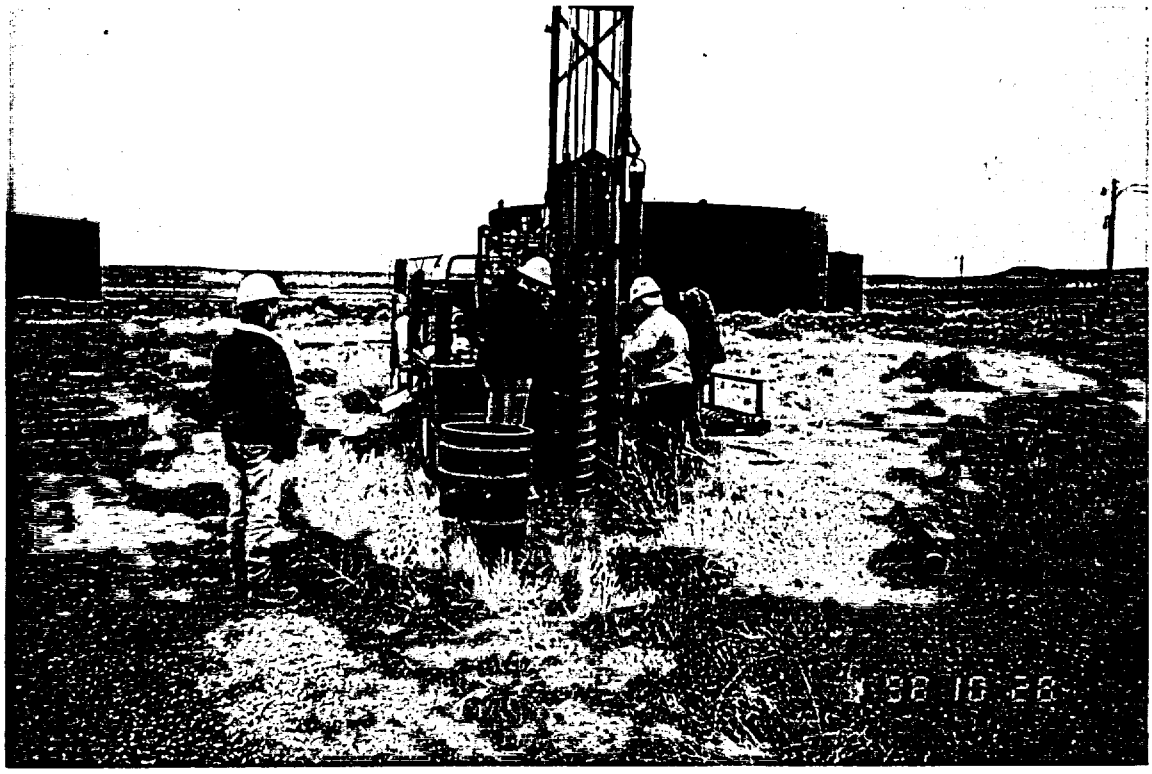

PHOTO 41
Facing south, view of MW-4 location.

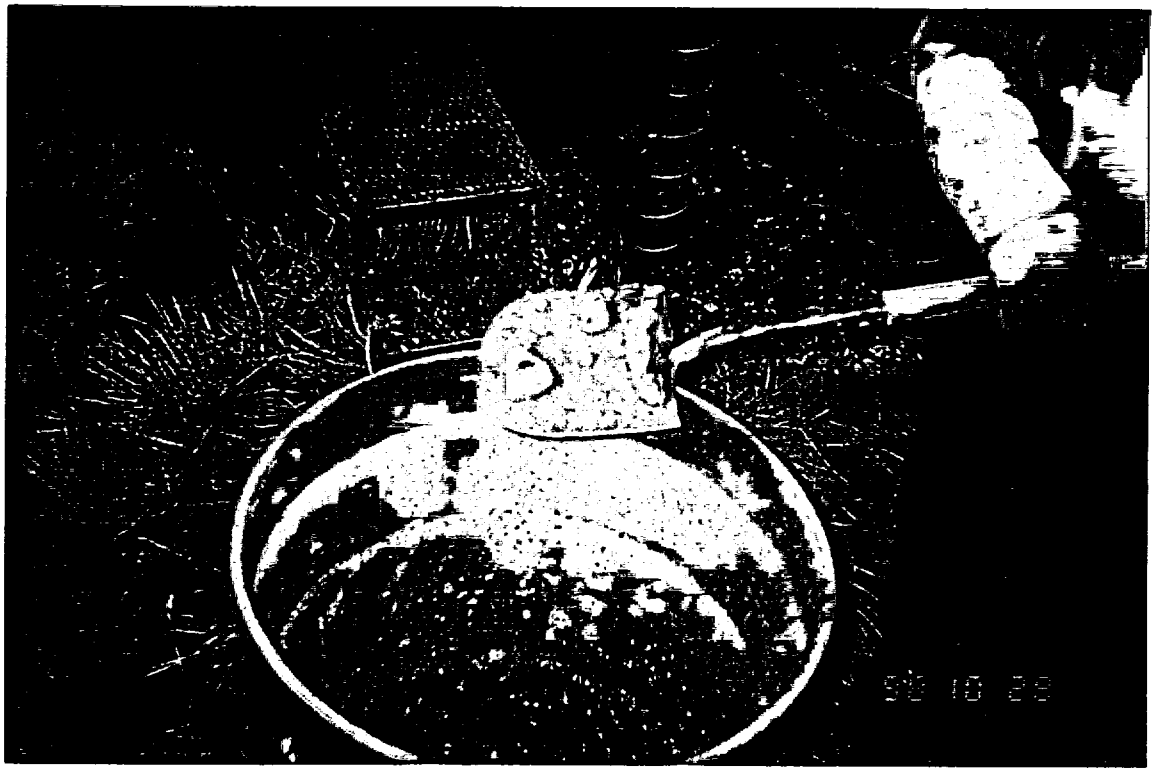

PHOTO 42
Silty gravel and cobbles at the location of MW-4.

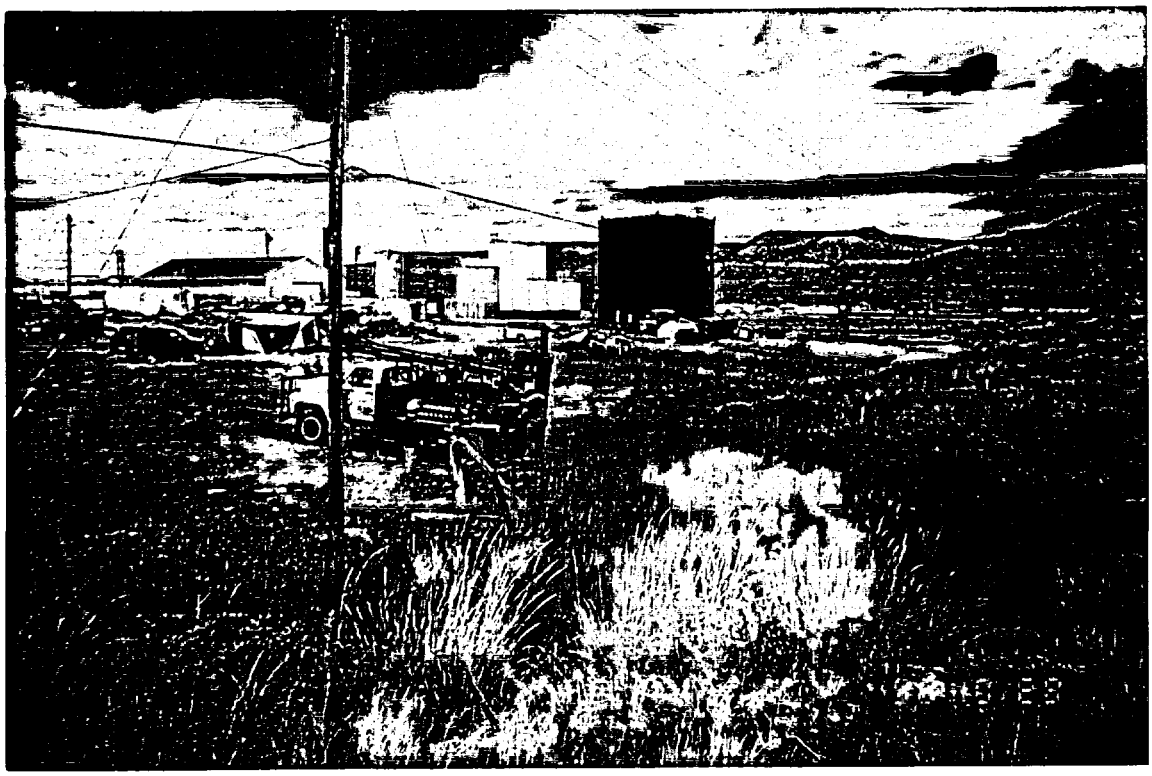

PHOTO 43
Facing east-northeast, view of the location of MW-5.

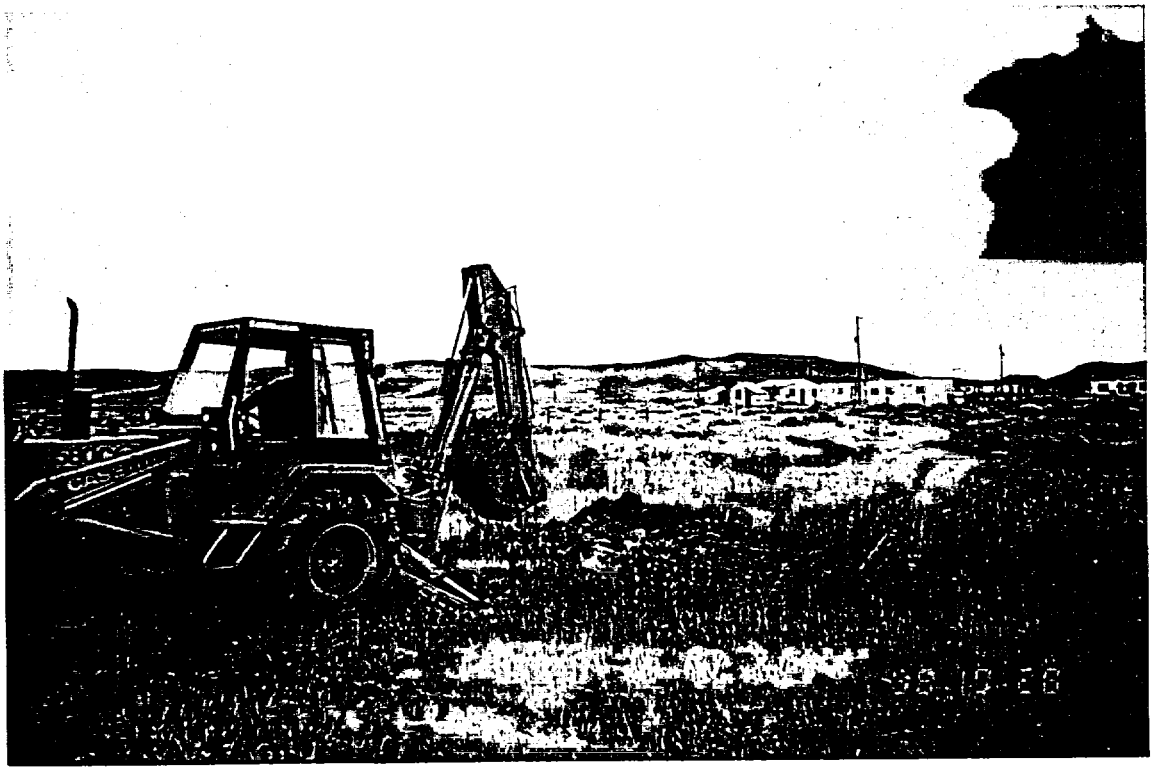

PHOTO 44
Facing west-northwest, view of backhoe digging test pits on the west part of the site.

APPENDIX B

Well Completion Details and Lithology

URS Operating Services, Inc.	Borehole Log	Page 1 of 1

Project Name	TDD Number	Well/Borehole Number
RJ Refinery	9804-02	BH-2

Well/Borehole Location

Elevation	Date Started	Date Completed
6,600 ft. msl	10-27-98	10-27-98
Field Investigator	**Drilling Company**	**Drilling Personnel**
Mike Carmien	Quality Remediation	Mike Mold
Drilling Method	**Drilling Rig (Type/Model)**	**Bit Type/Size**
Auger	BR 51 HD	Hollow Stem Auger/8"
Sampling Method	**Completion Depth**	**Depth of Water First Encountered**
split spoon	10 ft.	ft.

Depth	Core Recovery	Blow Counts per 6"	PID/FID Readings	Lithology and Description (USCS, name, color, sorting, grain size, consistency/hardness, cementation, particle shape, plasticity, bedding planes, joint/fractures, stain/odor, etc)	moisture content: dry	moisture content: moist	moisture content: wet	NOTES (samples, contact desc. etc)
2				0-6" Silty loam topsoil		●	○	
4				6"-2' Silty gravel, grey/tan no odor		●	○	
6				2-4.5' Silty gravel grey red 1-2" gravel no odor		●	○	
8				4.5-6' silty gravel		●	○	
10				6-8' moist Red tan gravelly clay		○	●	
12				8-10' Fine grained clay green No gravel, moist 8-9'		○	●	
14						○	○	
16						○	○	
18						○	○	
20						○	○	
22						○	○	
24						○	○	
26						○	○	
28						○	○	
30						○	○	
32						○	○	
34						○	○	
36						○	○	
38						○	○	
40						○	○	

Recorded By	Date	Checked By	Date

URS Operating Services, Inc.	Borehole Log	Page 1 of 1

Project Name	TDD Number	Well/Borehole Number
RJ Refinery	9804-02	MW-1

Well/Borehole Location: 250' S of Colpet Hwy, 200' W of Refinery Rd; NE NW Sec 7 T26N R11W

Elevation	Date Started	Date Completed
6,600 ft. msl	10-27-98	10-27-98
Field Investigator	**Drilling Company**	**Drilling Personnel**
Mike Carmien	Quality Remediation	Mike Mold
Drilling Method	**Drilling Rig (Type/Model)**	**Bit Type/Size**
Auger	BR 51 HD	Hollow stem Auger/8"
Sampling Method	**Completion Depth**	**Depth of Water First Encountered**
Spl.t spoon	9 ft.	6 ft.

Depth	Core Recovery	Blow Counts per 6"	PID/FID Readings	Lithology and Description (USCS, name, color, sorting, grain size, consistency/hardness, cementation, particle shape, plasticity, bedding planes, joint/fractures, stain/odor, etc)	moisture content: dry	moisture content: moist	moisture content: wet	NOTES (samples, contact desc. etc)
2				0-6" Silty Red Topsoil		●	○	
				6"-2' Grey-Red Hardpan dry clay		●	○	
4				2'-3.5' Silty gravel, angular chips		●	○	
				3.5-4' Tight clay, black stain, dry w/ petroleum odor		●	○	
8				4'-4.5' Refusal w/split spoon stained soil/clay		●	○	
10								
				5-6' Gravel clay, black stain heavy odor		●	○	
12								
				6-10' Stained clay no gravel heavy odor			●	
14								
16								
18								
20								
22								
24								
26								
28								
30								
32								

Stick-up: 3 ft above ground surface	Top of Seal at 2 ft.	Pack Type/Size - depth interval:	Screen Type: ■ PVC
Inner Casing Material: PVC	Bottom of Seal at 3 ft.	■ Sand 10/20 Silica @ 3-9'	□ Stainless Steel
Inner Casing Inside Diameter: 2 in.	Top of Screen at 4 ft.	□ Gravel	Bottom of Hole at 9 ft.
Top of Bentonite Grout: 2 ft.	Bottom of Screen at 9 ft.	□ Natural	Top of sandpack 3 ft.
	Well type: ___ flush mount X aboveground	Screen Slot Size: 0.010"	Bottom of Sandpack at 9 ft.

Recorded By	Date	Checked By	Date

URS Operating Services, Inc.	**Borehole Log**	Page 1 of 1

Project Name	TDD Number	Well/Borehole Number
RJ Refinery	9804-02	MW-2

Well/Borehole Location: 270' S of Colfet Hwy, 40' W of Refinery Rd; NENW Sec 7 T26N R11W

Elevation	Date Started	Date Completed
6600 ft. msl	10-28-98	10-28-98
Field Investigator	**Drilling Company**	**Drilling Personnel**
Mike Carmien	Quality Remediation	Mike Mold
Drilling Method	**Drilling Rig (Type/Model)**	**Bit Type/Size**
Auger	BK51 HD	Hollow-stem auger/8"
Sampling Method	**Completion Depth**	**Depth of Water First Encountered**
split spoon	19 ft.	12 ft.

Depth	Core Recovery	Blow Counts per 6"	PID/FID Readings	Lithology and Description (USCS, name, color, sorting, grain size, consistency/hardness, cementation, particle shape, plasticity, bedding planes, joint/fractures, stain/odor, etc)	moisture content: dry / moist / wet	NOTES (samples, contact desc. etc)
2				0-3' Silty loam., Topsoil	● ○	
4				3-4' Silty gravel	● ○	
6				4-5' Cobbles, angular gravel chips	● ○	
8				5-6' Grey silty gravel	● ○	
10				6-9' Silty gravel, stained w/odor	● ○	
12				9-12' Silty gravel - cobbles, turning black. odor.	● ○	
14				12-19' Silty clay, black, saturated Heavy odor & product staining	○ ●	
16					○ ○	
18					○ ○	
20					○ ○	
22					○ ○	
24					○ ○	
26					○ ○	
28					○ ○	
30					○ ○	
32					○ ○	

Stick-up: 3 ft above ground surface	Top of Seal at 2 ft.	Pack Type/Size - depth interval:	Screen Type: X PVC
Inner Casing Material: PVC	Bottom of Seal at 7 ft.	X Sand Silica 10/20 @ 7-19'	☐ Stainless Steel
Inner Casing Inside Diameter: 2 in.	Top of Screen at 9 ft.	☐ Gravel	Bottom of Hole at 19 ft.
Top of Bentonite Grout: 2 ft.	Bottom of Screen at 19 ft.	☐ Natural	Top of sandpack 7 ft.
	Well type: ___ flush mount X aboveground	Screen Slot Size: 0.010"	Bottom of Sandpack at 19 ft.

Recorded By	Date	Checked By	Date

URS Operating Services, Inc.	Borehole Log	Page 1 of 1

Project Name	TDD Number	Well/Borehole Number
RJ Refinery	9804-02	MW-3

Well/Borehole Location: 450' S. of Colpet Hwy, 5' W of Refinery Rd; NE NW Sec 7 T 26 N R 112 W

Elevation	Date Started	Date Completed
6600 ft. msl	10-27-98	10-27-98
Field Investigator	**Drilling Company**	**Drilling Personnel**
Mike Carmien	Quality Remediation	Mike Mold
Drilling Method	**Drilling Rig (Type/Model)**	**Bit Type/Size**
Auger	BR51 HD	Hollow stem auger/8"
Sampling Method	**Completion Depth**	**Depth of Water First Encountered**
Split Spoon	20 ft.	12 ft.

Depth	Core Recovery	Blow Counts per 6"	PID/FID Readings	Lithology and Description (USCS, name, color, sorting, grain size, consistency/hardness, cementation, particle shape, plasticity, bedding planes, joint/fractures, stain/odor, etc)	moisture content: dry / moist / wet	NOTES (samples, contact desc. etc)
2				0-2' silty loam, topsoil	●	
4				2-12' silty gravel 1-2" chips	●	
6				12-14' moist silty gravel	●	
8				14-20' saturated red clay	●	
10						
12						
14						
16						
18						
20						
22						
24						
26						
28						
30						
32						

Stick-up: 3 ft above ground surface	Top of Seal at 1.5 ft.	Pack Type/Size - depth interval:	Screen Type: PVC
Inner Casing Material: PVC	Bottom of Seal at 5 ft.	X Sand 10/20 Silica; 5-20'	☐ Stainless Steel
Inner Casing Inside Diameter: 2 in.	Top of Screen at 10 ft.	☐ Gravel	Bottom of Hole at 20 ft.
Top of Bentonite Grout: ____ ft.	Bottom of Screen at 20 ft.	☐ Natural	Top of sandpack 5 ft.
	Well type: ____ flush mount X aboveground	Screen Slot Size: 0.010"	Bottom of Sandpack at 20 ft.

Recorded By	Date	Checked By	Date

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Project Name	TDD Number	Well/Borehole Number
RJ Refinery	9804-02	MW-4

Well/Borehole Location: 580' S. of Calpet Hwy, 165' E of Refinery Rd; NE NW Sec 7 T26N R12W

Elevation	Date Started	Date Completed
6600 ft. msl	10-28-98	10-28-98
Field Investigator	**Drilling Company**	**Drilling Personnel**
Mike Carmien.	Quality Remediation	Mike Mold
Drilling Method	**Drilling Rig (Type/Model)**	**Bit Type/Size**
Auger	BR51 HD	Hollow Stem auger/8"
Sampling Method	**Completion Depth**	**Depth of Water First Encountered**
split spoon	24 ft.	ft.

Depth	Core Recovery	Blow Counts per 6"	PID/FID Readings	Lithology and Description (USCS, name, color, sorting, grain size, consistency/hardness, cementation, particle shape, plasticity, bedding planes, joint/fractures, stain/odor, etc)	moisture content: dry / moist / wet	NOTES (samples, contact desc. etc)
2				0-4' Silty loam, reddish tan, topsoil	● ○ ○	
4				4-5' Silty clay, non-plastic	● ○ ○	
6				5-8.5' Large cobbles, silty gravel	● ○ ○	
8				8.5-9.0' Silty gravel, pea gravel	● ○ ○	
10				9.0-11.0' 2-3" well-Rounded gravel	● ○ ○	
12				11.0-12.5' Same as above	● ○ ○	
14				12.5-19' Silty gravel, 1-2" Angular chips	○ ○ ○	
16					○ ○ ●	
18				19.0-24' Silty clay, Moist Red-Tan	○ ○ ○	
20					○ ○ ○	
22					○ ○ ○	
24					○ ○ ○	
26					○ ○ ○	
28					○ ○ ○	
30					○ ○ ○	
32					○ ○ ○	

Stick-up: 3 ft above ground surface	Top of Seal at 2 ft.	Pack Type/Size - depth interval:	Screen Type: ☒ PVC ☐ Stainless Steel
Inner Casing Material: PVC	Bottom of Seal at 9 ft.	☒ Sand 10/20 Silica 9-24	Bottom of Hole at 24 ft.
Inner Casing Inside Diameter: 2 in.	Top of Screen at 14 ft.	☐ Gravel	Top of sandpack 9 ft.
Top of Bentonite Grout: 2 ft.	Bottom of Screen at 24 ft.	☐ Natural	Bottom of Sandpack at 24 ft.
	Well type: ___ flush mount X aboveground	Screen Slot Size: 0.010	

Recorded By	Date	Checked By	Date

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Project Name	TDD Number	Well/Borehole Number
RJ Refinery	980402	MW-5

Well/Borehole Location: 250' S of Calpet Hwy, 730' E of Refinery Rd; NE NW Sec 7 T26N R11W

Elevation	Date Started	Date Completed
6600 ft. msl	10-28-98	10-28-98
Field Investigator	**Drilling Company**	**Drilling Personnel**
Mike Carmien	Quality Remediation	Mike Mold
Drilling Method	**Drilling Rig (Type/Model)**	**Bit Type/Size**
Auger	BR51 HD	Hollow Stem Auger/8"
Sampling Method	**Completion Depth**	**Depth of Water First Encountered**
split spoon	14 ft.	1 ft.

Depth	Core Recovery	Blow Counts per 6"	PID/FID Readings	Lithology and Description (USCS, name, color, sorting, grain size, consistency/hardness, cementation, particle shape, plasticity, bedding planes, joint/fractures, stain/odor, etc)	moisture content: dry / moist / wet	NOTES (samples, contact desc. etc)
2				0-1' Dry Clay-Peat	● ○ ○	
4				1-8' Saturated Clay, Green	○ ○ ●	
6					○ ○ ●	
8				8-14' Saturated Green Clay	○ ○	
10					○ ○	
12					○ ○	
14					○ ○	
16					○ ○	
18					○ ○	
20					○ ○	
22					○ ○	
24					○ ○	
26					○ ○	
28					○ ○	
30					○ ○	
32					○ ○	

Stick-up: 3 ft above ground surface	Top of Seal at 1 ft.	Pack Type/Size - depth interval:	Screen Type: ☒ PVC
Inner Casing Material: PVC	Bottom of Seal at 3 ft.	☒ Sand 10/20 Silica, 3-14'	☐ Stainless Steel
Inner Casing Inside Diameter: 2 in.	Top of Screen at 4 ft.	☐ Gravel	Bottom of Hole at 14 ft.
Top of Bentonite Grout: 1 ft.	Bottom of Screen at 14 ft.	☐ Natural	Top of sandpack 3 ft.
	Well type: ___ flush mount X aboveground	Screen Slot Size: 0.010	Bottom of Sandpack at 14 ft.

Recorded By	Date	Checked By	Date